

**EPA Superfund  
Record of Decision:**

**PETROCHEM RECYCLING CORP./EKOTEK PLANT  
EPA ID: UTD093119196  
OU 01  
SALT LAKE CITY, UT  
09/27/1996**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION VIII  
999 18th STREET SUITE 500  
DENVER, COLORADO 80202-2466



**Petrochem/Ekoteck Inc. Superfund Site  
Record of Decision  
September 1996**

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## **List of Acronym**

**AOC** - Administrative Order on Consent  
**ARARs** - Applicable or Relevant and Appropriate Requirements  
**BRA** - Baseline Risk Assessment  
**CERCLA** - Comprehensive Environmental Response, Compensation, and Liability Act of 1980  
**COC** - Chemical of Concern  
**CTE** - Central Tendency Exposure  
**EPA** - Environmental Protection Agency  
**ESRC** - Ekotek Site Remediation Committee  
**FS** - Feasibility Study  
**HRS** - Hazard Ranking System  
**LNAPL** - Light, Non-Aqueous Phase Liquids  
**MCLs** - Maximum Contaminant Levels  
**MCLGs** - Maximum Contaminant Level Goals  
**NCP** - National Contingency Plan  
**NPL** - National Priorities List  
**PAH** - PolyCyclic Aromatic Hydrocarbons  
**PCB** - Polychlorinated Biphenyl  
**ppb** - parts per billion  
**ppm** - parts per million  
**PRG** - Preliminary Remediation Goals  
**PRP** - Potentially Responsible Party  
**POTWs** - Publicly Owned Treatment Works  
**PNC** - Present Worth Cost  
**RA** - Remedial Action  
**RAO** - Remedial Action Objectives  
**RCRL** - Resource Conservation and Recovery Act  
**RD** - Remedial Design  
**RI** - Remedial Investigation  
**RME** - Reasonable Maximum Exposure  
**ROD** - Record of Decision  
**SARA** - Superfund Amendments and Reauthorization Act of 1986  
**TBC** - To be considered  
**THE** - Total Extractable Hydrocarbons  
**TPH** - Total Petroleum Hydrocarbon  
**TSCA** - Toxic Substances Control Act  
**UDEQ** - Utah Department of Environmental Quality

## **The glossary of Terms**

**Administrative Order on Consent (AOC):** A legal agreement between EPA and one or more potentially responsible parties whereby the potentially responsible party or parties agree to perform or pay the cost of site investigations or cleanup.

**Administrative Record:** A file established and maintained by the lead agency that contains all the documents used by EPA to make a decision on the selection of a remedial action. The administrative record is available for public review and a copy is established at or near the site, usually at one of the information repositories.

**Alternative:** A cleanup option for reducing site risk by limiting or eliminating the exposure pathway by reducing, removal, containment or treatment of the contamination.

**Applicable Requirements:** Those cleanup standards, standards or control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and are more stringent than federal requirements may be applicable.

**Aquifer:** A geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs.

**Baseline Risk Assessment (BRA):** A study used by EPA to evaluate the potential risks to human health if nothing is done to remediate a site or eliminate the risks. The BRA considers current use and hypothetical future use of the site.

**Capital Costs:** The costs of items such as buildings, equipment, engineering, and construction. Construction costs include labor, equipment and material costs.

**CERCLA:** The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986.

**Chemicals of Concern:** The most prevalent and toxic site-related chemicals identified and released at a Site.

**Compliance Boundary:** The boundary at the Petrochem/Ekotek Site where chemical-specific remediation levels and performance standards must be met. Not necessarily equivalent to the

physical ownership, or site boundary, but rather defined by the nature and extent of the contamination at the site.

**Contingency Measures:** Measures that detail the action to be taken in response to a remedy component failure.

**Excess Lifetime Cancer Risk:** The incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. A cancer risk of  $1 \times 10^{-6}$  is one additional case of cancer (over background levels) per million people exposed (a one in a million chance of having cancer). The NCP specifies the  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  risk level as a "target range" within which to manage risk at Superfund sites.

**Exposure:** Contact of a chemical with the outer boundary of a human (skin, nose, mouth, skin punctures and lesions) to include dermal, ingestion and inhalation exposures.

**Exposure Parameter:** Factors such as body weight, breathing rate, or time/activity that may be needed to quantify (calculate) human exposure to a contaminant.

**Exposure Pathway:** The course a hazardous substance (including chemicals of concern) takes from a source to a receptor. An exposure pathway describes a unique mechanism by which an individual or population is exposed to chemicals or physical agents at or originating from a site. Exposure pathway includes a source or release from a source, an exposure point, and an exposure route.

**Exposure Point:** A geographical location of potential contact between a receptor and a chemical or physical agent, e.g., an industrial worker ingesting soil containing PCBs.

**Exposure Point Concentration:** Concentration at the point where receptors may be exposed.

**Exposure Route:** The way a chemical or physical agent comes in contact with a receptor, that is, inhalation, ingestion, dermal contact, e.g., ingestion of vinyl chloride in the ground water by a hypothetical future industrial worker.

**Exposure Setting:** A combination of potential land uses and exposure routes that describe the ways by which a specific type of receptor can contact contaminants, for example, residential setting, occupational setting, recreational setting.

**Feasibility Study (FS):** A study undertaken to develop and evaluate options for remedial action. The FS emphasizes analysis of alternatives and is generally performed concurrently and in an interactive fashion with the remedial investigation (RI), using data gathered during the RI. The study results are published in

a report referred to as the Feasibility Study.

**Fund or Trust Fund:** The Hazardous Substance Superfund established by Section 9507 of the Internal Revenue Code of 1986.

**Ground Water:** As defined by Section 101(12) of CERCLA, water in a saturated zone or stratum beneath the surface of land or water.

**Hazard Ranking System (HRS):** The method used by EPA to evaluate the relative potential of hazardous substance releases to cause health or safety problem or ecological or environmental damage.

**Hydrogeologic:** Relating to the science of hydrogeology, which studies the interactions of ground water and geologic formations.

**Intake:** The measure of exposure expressed as the mass of a chemical that crosses an outer boundary of a human or the chemical per unit body weight per unit time, i.e., milligrams of chemical per kilogram of body weight per day.

**Institutional Controls:** Rules, regulations, laws, or covenants that may be necessary to assure the effectiveness of a cleanup alternative. Examples of institutional controls include, but are not limited to, deed restrictions, water use restrictions, zoning controls, and access restrictions.

**Light, Non-Aqueous Phase Liquids (LNAPL):** A group of compounds which are lighter than water. When released to the environment, they often form a "plume" which floats on top of the ground water. Includes or may include, hazardous substances or contaminants, as the primary material or trapped within a matrix.

**Maximum Contaminant Levels (MCLs):** Standards established under the Safe Drinking Water Act, which identify the highest allowable levels of contaminants in drinking water sources. MCLs are often used to determine when remedial action would be appropriate to address a release of hazardous substances.

**National Contingency Plan (NCP):** The EPA's regulations governing all cleanups under the Superfund program. Published at 40 CFR Part 300.

**National Priorities List (NPL):** The list, compiled by EPA pursuant to CERCLA Section 105, of uncontrolled hazardous substance released within the United States that are priorities for long-term remedial evaluation and response.

**Offsite:** The area located outside of the physical boundaries of the Petrochem/Ekotek site.

**Onsite:** The area within the physical boundaries of the Petrochem/Ekotek site.

**Operation and Maintenance:** Measures required to maintain the effectiveness of the selected remedy including the cost of operating labor, maintenance, materials, energy, disposal, and administrative activities.

**Parts per billion (ppb)/parts per million (ppm):** Units commonly used to express concentrations of contaminants. For example, one ounce of trichloroethylene (TCE) in one million ounces of water is one ppm; one ounce of TCE in one billion ounces of water is one ppb.

**Performance Standards:** The standards, specified by EPA, that the remedy must meet. For treatment, these standards are concentrations that the treatment must achieve for identified contaminants. For disposal, these standards define the concentrations of wastes to be removed (in volume). For containment, these standards are the concentrations of wastes that are monitored at the containment boundaries to ensure the integrity of the containment system.

**Polycyclic Aromatic Hydrocarbons (PAR):** A class of organic (carbon-based) compounds which are associated with manufacturing and petrochemical wastes.

**Polychlorinated Biphenyl (PCB):** A class of organic (carbon-based) compounds which are widely found mixed with transformer oils. PCBs have been identified as a cancer-causing agent, or carcinogen.

**Potentially Responsible Party (PRP):** An individual or company (such as owners, operators, transporters, or generators of hazardous waste) potentially responsible for, or contributing to, the contamination problem at a Superfund site, pursuant to CERCLA.

**Preliminary Remediation Goals (PRGs):** The goals set during the development of the feasibility study for the chemicals of concern at a site. These goals can be derived from policy, regulations, risk-based science, technology, or to-be-considered guidance or criteria. These goals become performance standards when presented in the Record of Decision.

**Present Worth Cost (PWC):** An analysis of the current value of all costs. Also known as Net Present Worth, the PWC is calculated based on a 30-year time period and a predetermined interest rate.

**Proposed Plan:** A document that summarizes EPA's preferred cleanup strategy, the rationale for the preference, and all of the alternatives presented in the detailed analysis of the feasibility study. The Proposed Plan solicits review and comment on all alternatives under consideration.



**Publicly Owned Treatment Works (POTW):** A municipal or local facility that collects, manages, and treats wastewater.

**Reasonable Maximum Exposure (RME):** The RME is the highest exposure that is reasonably expected to occur at a site. It is the product of a few upper-bound exposure parameters with primarily average or typical exposure parameters so that the result represents an exposure that is both protective and plausible, exposure point concentration and exposure frequency and duration, that is a mixture of, distributions (averages, 95th percentile, etc.) to reflect a 90th percentile.

**Receptor:** Any organism (such as humans, terrestrials, wildlife, or aquatic) potentially exposed to chemicals of concern.

**Record of Decision (ROD):** A public document that explains the remedial action plan for a Superfund site. A ROD serves four functions:

- C It certifies that the remedy-selection process was carried out in accordance with CERCLA and with the NCP
- C It describes the technical parameters of the remedy, specifying the treatment, engineering, and institutional components, as well as remediation goals
- C It provides the public with a consolidated source of information about the site and the chosen remedy, including the rationale behind the selection
- C The ROD also provides the framework for the transition into the next phase of the remedial process, Remedial Design (RD)

**Relevant and Appropriate Requirements:** Those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to a particular site. Only those state standards more stringent than federal requirements may be considered relevant and appropriate. All state standards must be identified in a timely manner.

**Remedial Action (RA) or Remedy:** Those actions consistent with a permanent remedy taken instead of, or in addition to, a removal action in the event of release or threatened release of a

hazardous substance into the environment to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare at the environment.

**Remedial Action Objectives (RAOs):** Objectives developed by EPA at individual Superfund sites that, in connection with chemical-specific remediation goals and performance standards, define acceptable levels of risk.

**Remedial Design (RD):** The technical analysis and procedures which follow the selection of remedy for a site and result in a detailed set of plans and specifications for implementation of the remedial action.

**Remedial Investigation (RI):** A study undertaken to determine the nature and extent of the problem presented by a release of hazardous substances at a Site. The RI emphasizes data collection and site characterization, and is generally performed concurrently and in an interactive fashion with the feasibility study. The RI includes sampling and monitoring, as necessary, and the gathering of sufficient information to determine the necessity for remedial action and to support the risk assessment evaluation of remedial alternatives.

**Resource Conservation and Recovery Act (RCRA):** A Federal law that requires safe and secure procedures to be used in treating, transporting, storing and disposing of hazardous wastes.

**Respondent:** Identifies the party entering into an Administrative Order an Consent (AOC or Consent Order) with EPA.

**Subtitle C:** A program under RCRA that regulates the management of hazardous waste from the time it is generated until its ultimate disposal.

**Subtitle D:** A program under RCRA that regulates the management of solid waste.

**Superfund Amendments and Reauthorization Act of 1986 (SARA):** Amendments to CERCLA, enacted on October 17, 1986.

**Total Extractable Hydrocarbons (TEH):** A measure of the amount of petroleum-based contaminants present.

**Total Petroleum Hydrocarbon (TPH):** A measure of the amount of petroleum-based contaminants present.

**Toxic Substances Control Act (TSCA):** A Federal law which regulates the manufacture, processing, import, distribution, use, and disposal of toxic substances.

**Vertical Migration:** The ability of media such as water, to move vertically upwards or downwards through various subsurface strata.

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Section 1.0  
Declaration of the Record of Decision

**Section 1.0**  
**DECLARATION FOR THE RECORD OF DECISION**

**1.1 Site Name and Location**

Petrochem Recycling Corporation/Ekotek, Inc. Site  
Salt Lake County,  
Salt Lake City, Utah.

**1.2 STATEMENT OF BASIS AND PURPOSE**

This decision document presents the selected remedial action (RA) for the Petrochem/Ekotek Site (the Site), which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the basis and the purpose of the selected remedy for this Site.

The Utah Department of Environmental Quality (UDEQ) does not concur with the selected remedy to the U.S. Environmental Protection Agency (EPA). The information supporting EPA's remedial action decision is contained in the administrative record for this Site.

**1.3 ASSESSMENT OF THE SITE**

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

**1.4 DESCRIPTION OF THE SELECTED REMEDY**

The Site has been investigated as one operable unit with special emphasis on the contamination within the soils (to include buried debris) and the ground water (to include the LNAPL). A removal action was conducted in 1989 to remove sources of contamination at the Site (e.g., approximately 60 aboveground tanks, 1200 drums and 1500 smaller containers, three surface impoundments, an underground drain field, numerous piles and pits of waste material, underground tanks, incineration furnaces, and contaminated soils). The response actions described in this ROD will permanently address the principal threats at the Site through treatment of the LNAPL to reduce the toxicity, mobility, and volume of contaminants. Intrinsic remediation/attenuation will reduce the contaminants within the ground water to the

concentrations specified by the remediation performance standards. Soils exceeding the soil hot spot criteria will be excavated and disposed in a TSCA, hazardous or solid waste landfill. The low-level contaminated soils will remain onsite underneath a 42-inch soil cap.

The major components of the selected remedy include the following:

- o Excavation of surface soils exceeding the soil hot spots criteria and appropriate off-site disposal in a TSCA, hazardous waste, or solid waste permitted landfill;
- o Partial excavation of the buried debris for appropriate off-site disposal of debris and soils containing PCBs and saturated with light non-aqueous phase liquid (LNAPL) in a TSCA, hazardous waste, or solid waste permitted landfill;
- o Consolidation of soils exceeding the soil performance standards and remaining buried debris under a 42-inch onsite soil cap;
- o Direct excavation of LNAPL with recovered LNAPL being incinerated offsite and saturated soils being disposed offsite;
- o The ground water component is containment via intrinsic bioremediation which allows natural attenuation through biodegradation, dispersion, dilution, and adsorption to reduce contaminants in the ground water to concentrations protective of human health in a timeframe comparable to that which could be achieved through active restoration which has been determined to be within 10 years. The selection of intrinsic remediation includes monitoring and pilot studies to determine whether biodegradation of vinyl chloride is occurring and, if so, at what rate.

Two contingencies have been developed to address offsite migration or the ineffectiveness of the intrinsic remediation alternative. The containment contingency shall be implemented if offsite migration of the organic plume occurs or if the effectiveness of intrinsic remediation is not demonstrated. The arsenic contingency shall be implemented if arsenic exceeds the MCL of 0.05 mg/l within the plume or concentrations above the MM migrate beyond the compliance boundary.

The major components of the containment contingency include the following:

- o Placement and installation of wells at the compliance boundary.
- o Ground water extraction and discharge to POTW.
- o Pretreatment component onsite (e.g. UV oxidation) if required by permit prior to discharge to POTW.



The major components of the arsenic contingency include the following:

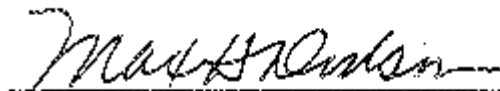
- o Placement/installation of wells at the compliance boundary.
- o Ground water extraction and discharge to POTW.
- o Pretreatment component onsite (e.g., activated alumina adsorption) if required by permit prior to discharge to POTW.

The soils and groundwater are to be remediated as a single operable unit for the Site.

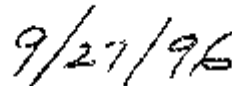
### 1.5 STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (or justifies a waiver of any Federal and State applicable or relevant and appropriate requirements that will not be met), and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum practicable extent. Principal elements of the remedy satisfy the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume.

Because this remedy contains the contaminated soils underneath a 42-inch cap suitable for redevelopment for industrial use, but not for unlimited use, and because the groundwater may have residual hazardous substances above action levels (MCLs or proposed MCLs) during the implementation of the remedy, ruling out unlimited use of onsite ground water during the remediation of the ground water, a review of soils and groundwater will be conducted no less often than every five years after initiation of the remedial action for each medium to ensure that the remedy continues to provide adequate protection of human health and the environment.



Max H. Dodson  
Assistant Regional Administrator  
U.S. Environmental Protection Agency, Region VIII



Date

Section 2.0  
Site Summary

## **Section 2.0 Site Summary**

### **2.1 Site Name, Location, and Description**

The Petrochem/EkoteK Site (the Site) is located in Township 1 North, Range 1 West, Section 23, and occupies approximately seven acres in an industrial corridor in the northern section of Salt Lake City, Utah (see Figure 2-1).

The Site is bordered on the north by an auto dismantler/recycler, and on the west, east and south by industrial/commercial properties. A residential district with approximately 50 homes is located to the south within 500 feet of the Site. The Salt Lake City Planning Commission Master Plan for the area of the site designates the land use as heavy industrial. Interstate Highway 15 is located to the west and the Wasatch Mountains are located to the east of the Site.

### **2.2 Current and Past Use of the Site and Adjacent Land Use**

Three oil refining and related facilities are located near the Site, one less than a quarter mile to the south and two less than two miles north of the Site. An EPA Superfund Site, Rose Park Sludge Pit, is located approximately 1,500 feet southwest of the Site. Utah Metal Works is located 1,000 feet south of the Site. The Utah Metal Works is a metal reclaiming / recycling facility that formerly processed transformers, containing polychlorinated biphenyl (PCBs), for salvage.

The property is divided by a railroad right-of-way into eastern and western portions which are enclosed by 6-foot (ft) chain link security fence. A security company provides daily walk-through and drive-by security. The property was operated as a used oil refinery and oil reclaiming/recycling facility from 1953 through 1988. The majority of the site operations occurred on the western portion of the property. The northwestern portion of the property, north of the main warehouse, contained the majority of the equipment used for oil refining, reclaiming, and recycling, including approximately 60 aboveground tanks, ranging in capacity from less than 1,000 to 90,000 gallons. The tanks and associated equipment and materials were removed from this area between August 1989 and March 1991, during a removal action conducted by the EkoteK Site Remediation Committee (ESRC) under United States Environmental Protection Agency (EPA) oversight. This area, referred to herein as the former tank farm/processing area, is currently covered by a geosynthetic liner. Storm water runoff from the area, which exhibits a gentle westward sloping surfaces, is collected in two surface impoundments. An onsite

collection and treatment system provides ongoing control of storm water runoff. Storm water is discharged to the Salt Lake City Water Reclamation Plant, under a discharge permit. There are no natural, permanent, or ephemeral surface water streams at or adjacent to the site. Hobo Warm Springs is located approximately 1000 feet to the northwest of the Site. Hobo Warm Springs drains to the north into the Jordan River via man-made canals. South of the former tank farm/processing area in the western portion of the site are several buildings consisting of the main warehouse, command post, offices, lab, and a metal-sided storage shed. See Figure 2-2 for visual reference.

The eastern portion of the property is primarily open, with buildings located around the perimeter and a concrete loading ramp located near the center. Sludge piles formerly located on the site were disposed during the removal action with the exception of approximately 125 tons of filter cake sludge stockpiled in the metal warehouse on the eastern portion of the site. Four underground storage tanks (USTs) were formerly located on the property. One (UST #2), containing diesel and solvents (i.e., TCE and PCE), was located just north of a small framed building on the east side of the railroad spur; during Phase II, the wood framed building immediately south of former UST #2 was removed to facilitate investigation of the UST. Another (UST #1) was located south of a former house in the southeastern corner of the property. A third UST (UST#4) was removed from the south end of the main warehouse, and consisted of three 55-gallon drums. UST#3 was removed from the northwestern corner of the eastern portion of the site.

## **2.3 Natural Resources**

### **2.3.1 Evaluation of Threatened and Endangered Species**

The site has undergone disturbance, including grading, importing of fill, and building construction. As a result, it contains little suitable habitats for native flora and fauna. Identified species at the site consist primarily of introduced species such as a rock dove (pigeon). A few native species that have adapted to urban habitats were observed at the site. Table 2.3.1A lists the observed species at the Petrochem/Ekotek site.

Approximately 25 percent of the site is vegetated, and the vegetation is typical of disturbed areas. Observed vegetation species at the Petrochem/Ekotek site are listed in Table 2.3.1B.

### **2.3.2 Evaluation of Wetland Areas**

Wetlands do not exist on the Petrochem/Ekotek site.

## **2.4 General Surface Water and Ground Water Resources**

### **2.4.1 Surface Water Resources**

There are no natural, permanent, or ephemeral surface water streams at or near the site.

### **2.4.2 Ground Water Resources**

The regional information indicates that sediments become finer-grained to the west, from mostly gravel with interbedded sand deposits, to mostly sand with interbedded clay and gravels, to mostly fine-grained deposits with interbedded sand, as one moves from the Wasatch Mountain front toward the center of the Salt Lake basin. The unconfined, predominantly gravel aquifer beneath the Petrochem/Ekotek property becomes a confined aquifer to the west, as it dips below the predominantly fine-grained lake sediments. Wells identified as part of a regional well survey, located less than one mile to the west of the Petrochem/Ekotek property, exhibit artesian conditions indicative of a confined aquifer. Ground water is encountered beneath the property at a depth of 15 to 20 ft below the ground surface (bgs). The horizontal hydraulic gradient at the Site is relatively flat. The observed limits of the contaminant plume underlying the Site include areas to the west and northwest of the Site within several hundred feet of the property boundary. The compliance boundary which delineates the extent of the contaminated ground water plume shall be verified during the remedial design of the response action. A ground water flow direction to the northwest in the vicinity of the site is consistent with the findings of Hely, et al. (1971). Ground water in deeper wells at the site is warmer and higher in electrical conductance than shallow ground water, indicating that the aquifer may be recharged in part by deeper geothermal water from the Warm Springs fault zone. The ground water beneath the site is between 19.8 and 20.8 EC at depths between 60 and 160 feet below the ground surface. The greater specific gravity of the deeper water limits vertical mixing of the shallower ground water with deeper ground water.

#### **2.4.2.1 Ground Water Well Survey**

An inventory of wells located within one mile of the Petrochem/Ekotek Site was conducted by reviewing well records and water rights applications filed with the Utah Division of Water Rights at the Utah Department of Natural Resources. Of the 19 wells investigated, it is important to note that none of these wells are currently being used for domestic drinking water purposes. Only one well is currently used for watering stock.

Section 3.0  
Site History and Enforcement Activities

## **Section 3.0 Site History and Enforcement Activities**

### **3.1 Operational History**

The Site was originally owned and operated as an oil refinery by O. C. Allen Oil Company, from 1953 to 1968. In 1968, Flinco, Inc. purchased the facility and operated the refinery until 1978. During that time Flinco changed its name to Bonus International Corp. In 1978 Axel Johnson, Inc., acquired the facility and operated it through its Delaware-based subsidiary, Ekotek, Inc. At this time, Ekotek, Inc. converted the Site into a hazardous waste storage and treatment, and petroleum recycling facility. Steven Self and Steve Miller purchased the site from Axel Johnson, Inc. in 1981 and reincorporated as Ekotek Incorporated, a Utah corporation. From 1980 to 1987, the facility operated under Resource Conservation and Recovery Act (RCRA) interim status, and received a hazardous waste storage permit in July 1987 for a limited number of these activities. Ekotek, Inc. declared bankruptcy in November of 1987. Petrochem. Recycling Corp. leased the facility in 1987 from Ekotek, Inc. and continued operations until February 1988. The Ekotek bankruptcy estate released the property (Parcel Numbers 0823407001 and 0823407002) pursuant to state statute, Utah Code Annotated Section 59-2-1336. Delinquent County taxes attributed to the property have not been paid. Ownership of the Site is uncertain at present following the bankruptcy proceedings of Ekotek Incorporated, the owner of the Site in 1989. A transfer of title to the property to either the county or a potential purchaser may occur as a result of a final tax sale. The tax sale must be initiated within four and a half years after the initial date of the delinquent taxes.

### **3.2 History of Site Investigations**

In 1980, Ekotek, Inc. filed a RCRA Part A permit application and achieved Interim Status. A RCRA Part B permit was issued in 1987 to Ekotek, Inc. Site operations were shut down in February 1988, after the issuance to Petrochem Recycling Corporation of a Notice of Violation by the Utah Bureau of Solid and Hazardous Waste and by the Bureau of Air Quality. In November 1988, Region VIII EPA Emergency Response Branch initiated a removal action at the site.

An Administrative Order on Consent (AOC) for Emergency Surface Removal (Docket CERCLA-VIII-89-25, Removal AOC) was issued to 27 Potentially Responsible Parties (PRPs) to undertake actions to, clean up the site on August 2, 1989. These PRPs operate as members of a voluntary association termed the Ekotek Site Remediation Committee (ESRC). On October 25, 1989, an Administrative Order for Emergency Surface Removal, EPA Docket No. CERCLA-VIII-90-04 (RCRA-VIII-7003-90-02)(Unilateral Order) was issued by EPA to 14 PRPs ordering compliance with the Consent

Order and participation in work conducted at the site. The Unilateral Order became effective on November 8, 1989.

Sources of contamination at the site included approximately 60 aboveground tanks, 3,200 drums and 1500 smaller containers, three surface impoundments, an underground drain field, numerous piles and pits of waste material, underground tanks, incineration furnaces, and contaminated soils. Contaminants associated with on-site sources include a wide range of organic substances such as chlorinated solvents and other volatile organic compounds, polynuclear aromatic hydrocarbons, phthalates, pesticides, Aroclor 1260, dioxin and furans. Heavy metals are also present in on-site sources.

As part of the emergency response, the ESRC removed surface and underground storage tanks, containers, contaminated sludges, pooled liquids, and processing equipment from the Site.

EPA began site assessment field operations in November 1989, at which time all contaminant sources discussed above were present on-site. Based on the contaminants and potential risks associated with the Site, the EPA placed it on the National Priorities List (NPL) on October 14, 1992. An Administrative Order on Consent (AOC) for the performance of the Remedial Investigation/Feasibility Study (RI/FS) was signed in July 1992 (Docket No. CERCLA (106) VIII-92-21). Members of the ESRC are Respondents for the RI/FS AOC. The Phase I field investigation was undertaken from December 1992 to March 1993 and Phase II investigations were conducted from August to October 1993. A final RI report was issued in July 1994 and the final FS report was issued in January 1995. Two addenda to the FS were submitted on February 24, 1995 and April 7, 1995. The results of the RI/FS are discussed in sections 5.0, 6.0, and 7.0.

### **3.3 History of CERCLA Enforcement**

#### **3.3.1 PRP Search**

EPA issued "Notice of Potential Liability" and "CERCLA 104(e) information request" letters to 47 Potentially Responsible Parties (PRPs) for the Removal Action on December 22, 1988. Follow-up letters were sent to seven of the 47 PRPs on January 20, 1989. EPA issued 104(e) information request letters to an additional 32 PRPs on September 26, 1989 and to 468 PRPs on February 12, 1991.

EPA issued general notice letters and a published waste-in list on November 23, 1993 to initiate a de minimis settlement, offer to eligible parties. The 104(e) data base and waste-in list was updated in response to the November 23, 1993-settlement offer package. The waste-in list was republished on March 25, 1994 and



again on April 5, 1994. The April 5, 1994-waste-in list is the EPA's most current list and contains 588 PRPs. Shortly thereafter, ESRC identified additional PRPs numbering more than 500 parties.

### **3.3.2      De minimis Settlements**

EPA offered de minimis settlements to all generator PRPs whose volume was less than 100,000 gallons and did not contain PCBs. The purpose of the settlement was to allow small volume parties to cash-out their liability to the United States arising from activities related to the Petrochem/Ekotek site thereby reducing the settler's transaction costs at the site. The estimated total site response cost for the settlement was derived from the past cost at the site, EPA's estimation of the future response action, and operation and maintenance (O&M) at the site for 30 years. EPA's estimation of the future response action, and O&M at the site for 30 years was based upon the first two quarters of data from the remedial investigation (i.e., pre-ROD) and is thoroughly documented in a report titled the Preliminary Identification of Remedial Alternatives (PIRA). Petrochem/Ekotek's past cost (to include monies spent on the removal action and RI/FS) totaled approximately \$12 million. The remedial action was estimated in the PIRA to be approximately \$43 million and the O&M was estimated to be approximately \$14 million which computed to an estimated total site response cost of \$69 million.

EPA has entered into de minimis settlements with a total of 411 settlers (including inability to pay settlers) with an associated volume of 2,078,584 gallons and total settlement payments of \$8,591,065.91. The money from EPA's de minimis settlements have been placed into a special account dedicated to the Petrochem/Ekotek Site.

### **3.3.3      Other Settlements**

ESRC engaged in litigation with the PRPs at the site for purposes of recovering the committee's costs. The case was filed in the U.S. District Court for the District of Utah as Ekotek Site PRP Committee V. Self, et al., Case No. 2:95-CV-0154K. ESRC has been successful in reaching settlements with all but approximately 100 parties remaining in their private law suit. In addition, ESRC has recently identified an additional 1200 parties for settlement, not previously named in their law suit.

### **3.3.4      Cost Recovery**

ESRC, as respondents to the Administrative Order on Consent for Emergency Surface Removal, EPA Docket No. CERCLA-VIII-89-25 (Removal AOC) and the RI/FS AOC, Docket Number CERCLA-VIII-92-21, has paid \$1,645,536 to EPA for reimbursement of EPA's past costs

incurred in connection with the AOCs as of July 15, 1992.

A demand for costs of \$1,054,478.88 incurred by EPA under the Removal AOC over the period of October 1, 1980 through December 31, 1992 was sent to ESRC on July 21, 1993. These costs were adjusted to \$935,822.71 on August 31, 1993. These costs were disputed by ESRC and were litigated in a suit brought by EPA against ESRC. In settlement of the litigation, ESRC will pay 89% of costs demanded.

An updated demand for costs of \$20,270.07 incurred under the Removal AOC for calendar year 1993 was sent to ESRC on August 24, 1994. The demand was later withdrawn. Additional costs (approximately \$22,000) incurred by EPA in connection with the Removal AOC in calendar year 1994 were also identified.

An updated demand for EPA costs of \$417,970.40 incurred under the RI/FS AOC over the period of October 1, 1980 through December 31, 1992 was sent to ESRC on July 28, 1993. These costs were paid by ESRC on September 7, 1993.

A second demand for EPA costs of \$416,636.39 was sent to ESRC on August 19, 1994. These costs were incurred under the remedial RI/FS AOC for calendar year 1993 and were paid by ESRC on October 5, 1994.

A third demand for costs of \$773,380.65 incurred under the RI/FS AOC for calendar year 1994 was issued to ESRC via a billing dat August 11, 1994. This billing was subsequently amended on October 24, 1995 and again an November 22, 1995. ESRC paid \$492,255.12 plus interest for a total of \$494,385.30 on January 24, 1996.

These past costs are EPA's administrative cost of providing oversight of the AOCs, and include providing funds to UDEQ and the Community Technical Assistance Grant for purposes of participating in the Superfund process.

### **3.4 History of RCRA Enforcement**

Steven Self and Steve Miller purchased the site from Axel Johnson, Inc. and operated the site under the name of Ekotek Incorporated, a Utah corporation, from 1981 to 1987, as a waste oil recycling facility. Their operation of the facility lead to an indictment by the United States on 12 counts of conspiracy, falsifying records, receiving waste outside of the permit, violation of Clean Water Act, and mail fraud. Steve Miller pleaded guilty to three counts and was sentenced to perform 1,000 hours of community service. Steven Self was tried by a jury in the U.S. District Court of Utah and was found guilty of six counts and was sentenced to six months in a halfway house and six months of home confinement. The U.S. 10th Circuit Court of

Appeals reversed all but two of the convictions involving the illegal storage of hazardous waste and the falsifying of records regarding receipt and disposal of PCB contaminated natural gas condensate.

**Section 4.0**  
**Highlights of Community Participation**

## **Section 4.0**

### **Highlights of Community Participation**

EPA implemented a community involvement program to keep the community informed about the Petrochem/Ekotek Site, and to provide an opportunity for citizens to participate in the Superfund process.

#### **4.1 Community Relations Plan**

The Petrochem/Ekotek Community Relations Plan was published on December 11, 1992. The community interviews were conducted February 4 through 6, 1992.

#### **4.2 Technical Assistance Grant**

SARA provides that technical assistance grants may be awarded to groups who may be affected by a Superfund site. The purpose of these grants is to foster informed public involvement in decisions related to a site by providing funds for a particular group to hire independent technical advisors.

A Technical Assistance Grant was awarded to the Capital Hill Neighborhood Council (CHNC) on September 16, 1992. This grant is being used to fund reviews and analyses by technical experts.

#### **4.3 Outreach Program**

Six fact sheets were released to the public regarding a variety of subjects from January 1990 to October 1993. Table 4.3 lists the titles, dates of release, and brief descriptions of each of the fact sheets.

The RI/FS and the Proposed Plan for the Petrochem/Ekotek Site were released to the public for comment on July 3, 1995. These two documents were made available to the public in the Administrative Record.

The notice of availability for the RI/FS report, The Proposed Plan, and other documents in the administrative record was published in the Salt Lake City Tribune and the Deseret News on July 10, 1995. That notice also opened the public comment period, which ran from July 10, 1995 through August 9, 1995. A request to extend the public comment period to September 8, 1995 was granted and a notice announcing that extension was published in the Salt Lake City Tribune and the Deseret News on August 7, 1995. An announcement of the second extension of the public comment period were published on September 14, 1995 in the Salt Lake City Tribune and the Deseret News, extending the comment period to October 23, 1995.

In addition, a public meeting was held on July 26, 1995 at Utah Department of Environmental Quality (UDEQ) in Salt Lake City. At this meeting, the public was invited to provide comments on the Proposed Plan and to ask questions of the EPA and UDEQ representatives about the Site and the remedial alternatives under consideration. A response to the comments received during the public comment period is included in the responsiveness summary which is part of this Record of Decision (ROD). This decision document presents the selected remedial action for the Petrochem/Ekotek Site in Salt Lake City, Utah, chosen in accordance with CERCLA, as amended by SARA, and the NCP. The remedial action decision for this site is based on documents in the Administrative Record.

#### **4.4 Information Repositories**

The Administrative Record is maintained at two locations: at the Marriott Library in Salt Lake City, Utah and the EPA Region VIII Superfund Records Center in Denver, Colorado.

Section 5.0  
Scope and Role of Operable Units

## Section 5.0

### Scope and Role of Operable Units

The potential risks posed by conditions at the Site include exposure to contaminated soil and groundwater. The remedy addresses the risks as a single operable unit for the Site. The ground water component is containment via intrinsic bioremediation which allows natural attenuation through biodegradation, dispersion, dilution, and adsorption to reduce contaminants in the ground water to concentrations protective of human health in a timeframe comparable to that which could be achieved through active restoration. The selection of intrinsic remediation includes monitoring and pilot studies to determine whether biodegradation of vinyl chloride is occurring and, if so, at what rate. The soils and LNAPL components include:

- o Excavation of surface soils exceeding the soil hot spots criteria and appropriate offsite disposal in a TSCA, hazardous waste, or solid waste landfill;
- o Partial excavation of the buried debris for appropriate offsite disposal of debris and soils containing PCBs and saturated with light non-aqueous phase liquid (LNAPL) in a TSCA, hazardous waste, or solid waste landfill;
- o Consolidation of soils exceeding the soil performance standards and remaining buried debris under a 42-inch onsite soil cap;
- o Direct excavation of LNAPL with recovered LNAPL being incinerated offsite and saturated soils being disposed offsite.

This response eliminates future exposure to contaminated soils through removal and offsite disposal of the soils that exceed the hot spot criteria; prevents exposure to soils within EPA's acceptable risk range for industrial use; prevents partitioning of contaminants from LNAPL to the ground water; prevents further contaminant migration in the ground water; and treats ground water via intrinsic remediation/natural attenuation. This remedy is considered the final response action for this site and is described in further detail in Section 10.0. The selected remedy is consistent with, and incorporates all past response actions for the Site taken in conjunction with the Emergency Surface Removal AOC.



Section 6.0  
Summary of Site Characteristics

## **Section 6.0**

### **Summary of Site Characteristics**

This section provides an overview of the Petrochem/Ekotek Site's contamination, including the source, nature and extent, concentrations, and volumes of contamination. Actual routes of exposure and exposure pathways are discussed in Section 7.0. A general overview of the Petrochem/Ekotek Site is presented in Section 2.0.

#### **6.1 Extent of Contamination in Affected Media**

Releases of hazardous substances at the Site occurred during the operation of the site primarily due to disposal practices and spills. on-site sources were found to be poorly contained, leaking, and unlined. The known primary source materials (tanks, drums, containers, filter cake piles, and liquids, as described in Section 2.0 above) were removed from the site during the Emergency Surface Removal Action. The ground surface in the area where the processing equipment and tank farms were located was covered on an interim basis in February 1992 with a geosynthetic liner held in place with sand bags. The liner was placed to minimize infiltration and to prevent contamination of storm water runoff from the site. All storm water collected on the geosynthetic liner is presently treated and discharged under a permit to the sewer system.

Figures 6.1.A and 6.1.B identify the location of all soil sampling and the location of all monitoring wells and Geoprobe samples.

##### **6.1.1 Soils**

The site was divided into areas, based on similar types of chemicals, knowledge of past uses and operations, associated impacts, and geography. These areas will be used to describe the nature and extent of contamination of the soils. However, the site was not divided into these subareas for the quantitative or qualitative portions of the risk assessment.

###### **6.1.1.1 Background**

To evaluate metal detections in soil, a statistical comparison was made between onsite surface soil and offsite reference (background) samples. This comparison was conducted using the Mann-Whitney statistical test, and was used to eliminate some metals as chemicals of concern (COCs CDM, 1994). Results of the analysis indicated that only beryllium concentrations were significantly higher in onsite than in offsite soil samples and thus beryllium was retained as a COC. Arsenic, cadmium, chromium, copper, lead, manganese, nickel, vanadium, and zinc

were eliminated as COCs in surface soils when compared to their respective reference concentrations because of low detection frequencies.

The Phase I and II surface and subsurface soil data was divided into separate categories depending on location for the evaluation of risk. These categories were onsite surface and subsurface samples, offsite surface reference samples, and all other surface and subsurface samples. Offsite samples that may have been impacted by the site could not be considered reference locations. Only soil samples collected inside the fence were considered for developing the exposure point concentration. Analytical data were validated by RUST E&I.

Summary statistics were developed for the onsite surface soils, reference surface soils, and onsite subsurface soils. The frequency of detection, the range of detections, mean, standard deviation, and the upper 95% one-sided confidence limit on the mean were estimated. The exposure point concentration was chosen as the lesser of the maximum detection and the upper 95% one-sided confidence-limit on the mean. This exposure point concentration was compared to the toxicity/concentration screening criteria during the selection of COCs and is used in quantitative risk analysis equations for those chemicals which will be retained as COCs to determine chronic daily intake (CDI). Summary statistical tables for onsite surface soils, reference surface soils, and onsite subsurface soils are shown in Tables 6.1.1.1A, 6.1.1.1B, and 6.1.1.1C, respectively.

#### **6.1.1.2 Nature and Extent of Contamination**

A general summary of the nature and extent of impacts to the site soils follows:

- C The former tank farm/processing area comprises the northern part of the western portion of the property, from the main warehouse building north to the maximum extent of site impacts, and from Chicago Street east to the former railroad spur (Figure 2-1). In the former tank farm/processing area, non-fuel volatile organics were uncommon, and were not detected at concentrations higher than 2.85 parts per million (ppm). Benzene, toluene, ethylbenzene, and xylene (BTEX) were observed in shallow soil at concentrations up to 64 ppm. Hydrocarbon impacts were evident from widespread total extractable hydrocarbons (TEH) detections up to 65,000 ppm. Semivolatile organic compounds were detected up to 56.4 ppm, but decreased with depth. PCBs were detected up to 92 ppm (historical data showed concentrations up to 150 ppm). Dieldrin was the only pesticide detected, up to a maximum of 0.02 ppm. Metal detections were of the same order of magnitude as detections in the offsite reference samples. Arsenic, beryllium, and thallium were detected at

concentrations of up to 83.6, 0.896, and 45 ppm, respectively, which is above maximum offsite concentrations of 36.1, 0.39, and 36 ppm, respectively. Silver was detected up to 15 ppm in surface soil, but was not detected in offsite reference samples.

Four soil samples were collected, three at a depth of 15 ft and one at 5 ft, for Toxicity Characteristic Leaching Procedure (TCLP) analysis of volatiles, semivolatiles, PCBs, herbicides, and metals. The samples were collected from heavily hydrocarbon-impacted soil within and immediately adjacent to (south of) the former tank farm/processing area, to determine if the oily soil is leachable. The sample locations were chosen to represent the tank farm, and were taken from heavily impacted areas as indicated by Phase I and previous (pre-RI) sample results.

TCLP results indicate that the soil is not hazardous by the characteristic of toxicity under the Resource Conservation and Recovery Act (RCRA) regulations. Based on visual observation of stained soils and light non-aqueous phase liquid (floating oil)(LNAPL), soil contamination in this area extends from the ground surface to the water table in the central and western part of the area, and only to a depth of about 5 ft in the eastern part. The lateral extent of impacts to surface soil has been defined by the samples off-property to the north, which show concentrations of TEH in surface soil of 4,100 to 8,370 ppm in the adjacent auto wrecking yard. These samples have been assumed to represent the northern limit of site impacts. Samples collected further to the north did not show evidence of impacts. The LNAPL which is present below the tank farm area extends to the north and has likely contaminated subsurface soils immediately above the water table in this area.

During drilling and trenching activities, debris, including what appears to be a subsurface concrete slab, was encountered in the eastern part of the former tank farm/processing area. The apparent slab is approximately 120 by 60 ft and was encountered at a depth of approximately 4 ft (Figure 2-2). The soils beneath the slab have not been characterized with respect to constituents and concentrations.

- C The area east of the main warehouse includes the area east of (behind) the main warehouse building, extending to the former railroad spur (Figure 2-2) herein referred to as the "debris area." This area generally coincides with a former acid sludge neutralization mixing area, which later was

filled with rubble and debris. in this area, a trench was excavated to investigate the potential for impacts due to former sludge mixing activities. A variety of debris was uncovered including concrete, wood, rubber tires, metal, and bricks, indicating dumping. Impacts were observed to a depth of approximately 6 ft. Visible hydrocarbons in the soil were tarry, viscous and appeared different from oil observed elsewhere in the former tank farm, pointing to a separate source (such as sludge mixing). Volatiles were detected at trace concentrations. BTEX constituents were observed in shallow soil at concentrations up to 37 ppm. TEH was noted up to 103,000 ppm. Semivolatile compounds were detected at concentrations up to 60.5 ppm. PCBs were detected up to 6.36 ppm. Antimony and mercury were detected at concentrations of 14 and 0.6 ppm, respectively, above maximum offsite levels of 12.1 and 0.291 ppm, respectively. Lead was detected in two samples at 1,260 and 3,880 ppm, compared to a maximum offsite concentration of 1,150 ppm.

- C The main warehouse and buildings area comprises the main warehouse building and parking lot and the remainder of the western portion of the property (Figure 2-2). In this area, TEH was detected at levels up to 1,600 ppm, primarily in the parking lot west of the main warehouse (a value of 19,450 ppm at the extreme southwestern corner of the property appears spurious due to duplicate sample results of 49 ppm). Detections of BTEX constituents were less than 0.5 ppm. Semivolatiles were detected in surface soil up to 33.4 ppm, and decreased with depth. Aldrin and dieldrin were detected up to 0.08 ppm, respectively. Because of the potential for soil impacts beneath the main warehouse building, these soils, although not sampled during the RI, have been considered as potentially requiring remediation in the FS.
- C The former underground storage tank (UST) #2 area includes the area in the southern part of the property impacted by the former diesel UST (Figure 2-2). Impacts from tank leakage/spillage were revealed by trenching. The area of impacted soil is limited at the surface, but increases in, size with depth, and appears to extend to the water table. TEH was detected up to 14,500 ppm and semivolatiles were detected up to 63 ppm. BTEX concentrations were less than 5 ppm. PCBs were not detected. Metals concentrations were within the range of concentrations for offsite reference samples with the exception of beryllium detected at 0.45 ppm, above the maximum offsite concentration of 0.39 ppm.
- C The area northeast of the metal warehouse is the area at the northeastern edge of the property (Figure 2-2). In this area, TEH (140,000 ppm) found at the surface decreases with depth to nondetect at 5 ft. Of the BTEX constituents, only xylenes were detected at a trace concentration of 0.005 ppm.

PCBs were not detected. Arsenic, beryllium and lead concentrations up to 372, 1.11, and 1,170 ppm, respectively, was above maximum offsite reference sample concentrations of 36.1, 0.39, and 1,150 ppm, respectively. These impacts appear to be related to former sludge storage in this area.

Soil impacts from organics are estimated to extend to a depth of approximately 3 ft. Detections of beryllium, arsenic, and lead in 10-ft depth samples at concentrations above that observed in the offsite reference samples suggest inorganic impacts to a depth of 10 ft. In the one sample where arsenic and lead detections were greater than offsite detections, a collocated sample at the same depth as the original sample indicated concentrations of arsenic and lead were an order of magnitude less than offsite detections (i.e., 4.29 and 10.6, respectively). This is less than the maximum offsite concentrations for arsenic and lead as described above.

- C The concrete loading ramp area includes the impacts around the elevated concrete loading ramp in the center of the eastern part of the property (Figure 2-2). In this area, TEH up to 160,000 ppm at the surface decreases to nondetect at a depth of 5 ft. BTEX detections were limited to trace concentrations of less than 0.01 ppm. PCBs were detected in spills north of the ramp, up to 1.65 ppm. Beryllium, mercury, copper and lead were detected at concentrations above those observed in offsite reference samples. Beryllium was detected up to 1.31 ppm, greater than the maximum offsite concentration of 0.39 ppm. Mercury was detected up to 0.496 ppm, above the offsite maximum of 0.291 ppm. Copper was detected up to 1,080 ppm, above the maximum reference sample concentration of 300 ppm. Lead was detected up to 1,910 ppm, as compared to the maximum offsite reference sample concentration of 1,150 ppm. Impacts appear to be related to former sludge storage in this area.
- C The remaining area of the site with soil impacts consists of an oily soil area northeast of former UST #2 where the old south tank farm area was located; a small area south of the concrete loading ramp and near the eastern boundary; and areas near the southern boundary. Trenching indicates the oily soil area is very localized and extends from a depth of approximately 1.5 to 3.5 ft. TEH was detected in this soil at a concentration of 203,000 ppm. BTEX concentrations were less than 3 ppm. This soil is believed to be associated with the former southern tank farm, which consisted of several aboveground tanks. In the soil south of the concrete loading ramp and near the western boundary, TEH was detected at levels up to 4,540 ppm in surface soil, but was not detected in subsurface soil in this area. BTEX

concentrations were less than 0.1 ppm. Metals concentrations were within the of concentrations observed offsite with the exception of beryllium and silver detected at concentrations of to 1.15 and 1.42 ppm, respectively.

At a few locations near the southern boundary of the property, arsenic, beryllium, chromium, vanadium, and silver were detected in surface soil at greater concentrations than those first observed in offsite reference soils. Arsenic was detected at concentrations up to 237 ppm, beryllium at concentrations up to 0.698 ppm, chromium at concentrations up to 57.1 ppm, vanadium at concentrations up to 33.6 ppm, and silver at concentrations up to 2.47 ppm.

Dioxins/furans were not analyzed for in any of the Phase I or Phase II surface soils data collected at the Petrochem/Ekotek site. Therefore, Field Investigation Team (FIT) data collected onsite for dioxins/furans by Ecology and Environment (E&E) in 1989 (E&E 1990) were used to represent surface soil data for the site. FIT collected ten onsite surface samples that were analyzed for dioxins/furans. Three of ten samples collected were located in lime, waste, or sludge piles that have since been removed and were not considered in developing the exposure point concentration. The remaining seven samples collected at the site were used to develop the exposure point concentration. The dioxins/furan data were validated by FIT.

The RI (see plate 4-11) data shows detections of PCBs in the following samples: S-1, S-35, S-39, and S-40 in the tank farm; S-21, S-45, and S-46 located near the metal-sided large shed; and W-13 south of the metal-sided large shed. In addition, figure 4-3 of the RI report shows a detection of PCB at depth (down to 5') in the buried debris area in trench BT2, sampling point 01.

#### **6.1.1.3 Volume Estimates**

The COCs in the soils contributing to the risk of the site, for both the future industrial and future residential scenarios, include noncarcinogenic and carcinogenic constituents. The noncarcinogenic constituents include aldrin, antimony, beryllium, dieldrin and thallium (as chloride). The carcinogenic constituents include aldrin, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, beryllium, dibenz(a,h)anthracene, dieldrin, indeno(1,2,3-c,d)pyrene, PCBs, 2,3,7,8-TCDD (TEF) and HxCDD.

Localized areas that contain elevated COC concentrations above an excess cancer risk of  $10^{-4}$  or hazard indexes greater than one for the industrial worker in the future have been identified as "hot spots." The soil COC preliminary remediation goals used to identify "hot spots" are provided below:

B	Benzo(a)anthracene - 780 mg/kg
B	Benzo(a)pyrene - 78 mg/kg
B	Benzo(b)fluoranthene - 780 mg/kg
B	Dibenz(a,h)anthracene - 78 mg/kg
B	Indeno(1,2,3-c,d)pyrene - 780 mg/kg
B	PCBs - 15 mg/kg
B	2,3,7,8-TCDD(TEF) - 0.186 ug/kg
B	Thallium- 160 mg/kg

Based on these levels, estimates for risk-based hot spot areas and volumes were developed. The areas containing known risk-based hot spot soil cover 7,000 square yards (SY) with a corresponding volume of 200 cubic yards (CY). Areas of known "total petroleum hydrocarbons (TPH) hot spots" ("TPH hot spot" is defined as exceedances of TPH of 100,000 ppm) include the volume beneath the metal warehouse on the northeast portion of the site (to a depth of 1 ft) (40 CY) and near the concrete loading ramp on the eastern portion of the site (90 CY), as shown on Figure 6.1.1.3A. Soils beneath the Main Warehouse building (to the water table)(2970 CY) were assumed to exceed the hot spot criteria rendering a site total of 3300 CY of hot spot removal.

Localized areas that contain COC concentrations above an excess cancer risk of  $10^{-4}$  or hazard indexes greater than one (i.e., Preliminary Remediation Goals (PRGs)) for the industrial worker in the future have been identified. The soil COC preliminary remediation goals used to identify soil PRG exceedance areas are provided below:

B	Benzo(a)anthracene - 7.8 mg/kg
B	Benzo(a)pyrene - 0.78 mg/kg
B	Benzo(b)fluoranthene - 7.8 mg/kg
B	Dibenz(a,h)anthracene - 0.78 mg/kg
B	Indeno(1,2,3-c,d)pyrene - 7.8 mg/kg
B	PCBs - 0.15 mg/kg
B	2,3,7,8-TCDD(TEF) - 0.00186 ug/kg
B	Thallium- 160 mg/kg

Based on these levels, estimates of areas and volumes for soils that exceed the PRGs were developed and are shown in Figures 6.1.1.3A, 6.1.1.3B, 6.1.1.3C and are listed on Table 6.1.1.3.

## 6.1.2 LNAPL

### 6.1.2.1 Nature and Extent of Contamination



Free-phase oil exists on the water table at the site. The extent of the floating oil below the former tank farm/processing area was estimated during the RI by CH2M Hill in 1992. CH2M Hill drilled ten wells (e.g., CH-1 through CH-10) during the investigation of the floating product. Phase I and II drilling and well installation indicates that light non-aqueous phase liquid (LNAPL) extends to the north beneath the adjacent salvage yard property. The groundwater plume also extends to the west off the physical boundaries of Petrochem/Ekotek property. The greatest thickness of oil appears to assume a generally north-south orientation. Although oil was detected during drilling of well W4a, and a sheen of oil was observed in the well casing at W4a in Phase I, the sheen was not observed in September 1993. The majority of the oil is located directly beneath the former tank farm, based on the thickness measurements performed during Phase I and II field program. The oil plume is defined on the northwest by wells W-7 and CH-8, to the west by wells CH-9 and CH-10, to the south by well W-3, MW-8, and W-6, and to the southeast by well CH-3. Temporary Phase I Geoprobe points (GP-1, GP-2, GP-3) and Phase II Geoprobe points (GP-35, GP-36, GP-37, GP-38, GP-39) indicate the extent of oil on the northeast. Figure 6.1.2.2 delineates the extent of the LNAPL plume.

#### **6.1.2.2. Volume Estimates**

The oil was sampled and a pilot test was performed to determine the effectiveness of hydraulic removal (RUST E&I, 1993b). That report estimated a total volume of oil present at the water table of approximately 10,000 gallons, and forms the basis for the development of the alternatives presented later.

The Floating Product Investigation Report, dated March 1992, developed by CH2M Hill on behalf of EPA provides a rough estimate of 22,000 gallons of LNAPL. Thus, the volumes may be adjusted in the field to reflect the removal of the LNAPL at the approximate percentages delineated in each of the alternatives. The affected volume of soils immediately adjacent to the LNAPL, expected to be saturated with LNAPL, is estimated to be 3,000 cubic yards. Figure 6.1.2.2 shows the extent of the LNAPL plume.

Available records of used oil shipments accepted at the site indicate that over the roughly 30 years of operation (late 1950s to 1988 approximately 50,000,000 gallons of used oil was shipped to the facility. Records also indicate that material was accepted with the used oil, including solvent waste. Available records show that approximately 335,000 gallons of solvent was also shipped to the Site, including auto and paint waste, cleaning liquid waste, methylene chloride, solvents and waste solvents, used oil with solvent odor, carbon tetrachloride, tetrachloroethylene, and 1,1,1-trichloroethane (TCA). The known volume of solvents is approximately 1 percent of the used oil total shipped to the site.

### 6.1.2.3 Principal Threat Wastes

Since no source areas for solvents have been identified, the possibility of the oil acting as a source to the ground water was investigated. In March 1995, the Light Non-Aqueous Phase Liquid (LNAPL) was re-analyzed for halogenated volatile constituents (solvents) by purge and trap concentration (EPA Method 5030) combined with gas chromatography (GC) as described in EPA Method 8010. The LNAPL was also analyzed specifically for vinyl chloride, 1,1,1-trichloroethane and tetrachloroethylene by mass spectrometry using selective ion monitoring (SIM). Vinyl chloride was detected at 480 ppb; 1,1,1-trichloroethane was detected at 130 ppb; and tetrachloroethylene was detected at 410 ppb. Previous LNAPL analytical methods used detection limits of 10,000 ppb and found no detections because the limits were high. The compounds that were detected in the LNAPL were evaluated as to the likelihood that they would dissolve from the oil into the ground water. Table 6.1.2.3 shows the results of the partitioning exercise. The predicted concentrations show that the maximum concentrations of vinyl chloride, 1,1,1-trichloroethane and tetrachloroethylene have the potential to partition into the ground water at concentration of 110 ppb, 0.55 ppb and 1.2 ppb, respectively. Upon further review, EPA derived a theoretical equilibrium partitioning of vinyl chloride from LNAPL at the site to ground water using the effective solubility of vinyl chloride (VC) in water. Data from the March 1995 sampling event was used and the effective solubility of VC in water was calculated using the simplifying assumptions of Raoult's Law which relates the effective solubility to the mole fraction of the compound in the mixture. The resulting partitioning from LNAPL to ground water, although subject to significant uncertainty, was close to the MCL of 2 ug/l. The March 1995 sampling of the LNAPL in the only sampling event where the detection limits were sufficiently low to detect the concentrations of the chemicals of concern (COCs). More studies would have to be completed to accurately describe the range of the concentrations of the COCs within the LNAPL using the lower detection limits, and to accurately estimate the mole fraction.

When the predicted concentrations in water are compared to the actual concentrations in water, it is clear that most compounds present in the LNAPL are not observed in ground water due to their affinity for the residual organic phase. Compounds with relatively high aqueous solubilities and low octanol-water coefficients, such as benzene, have been detected in the past at low concentrations. However, this partitioning exercise clearly demonstrates that the LNAPL is a likely source material of the vinyl chloride in the ground water. The source material is defined as material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water or acts as a source for direct exposure. Because of the concentrations of the solvents within

the LNAPL, the potential of the solvent to partition to the ground water exists, and the significant risk to human health or the environment should exposure occur, the plume and saturated soils above the plume are considered principal threat wastes.

### **6.1.3 Ground Water**

#### **6.1.3.1 Background**

Many of the chemicals identified as COCs in the human health BRA are present in the Salt Lake City area, either as naturally-occurring chemicals in soil and ground water, or as anthropogenic chemicals caused by over a century of urban and industrial development. As stated in EPA Risk Assessment Guidance for Superfund (EPA, 1989), "a comparison of sample concentrations with background concentrations is useful for identifying the non-site-related chemicals that are found at or near the site." The BRA for human health considered soil background, and eliminated a number of chemicals on the basis of statistical comparison of site concentrations to offsite concentrations. However, the BRA did not compare onsite concentrations of contaminants with offsite concentrations within the ground water, on the basis that an insufficient number of site reference samples existed to make a meaningful statistical comparison to three quarters of monitoring data. EPA believes that arsenic is a naturally-occurring (background) constituent in ground water in the Salt Lake area, however, the actual mean background concentration is difficult to select based on variability in arsenic across the region, but appears to be below the Maximum Contaminant Level (MCL) of 0.05 mg/l. Arsenic has been detected above the MCL on three occasions within the first three quarters of ground water data in two site wells. EPA believes that the detections of arsenic in the first three quarters may be partially attributed to suspended matter in the samples, since the wells may have been insufficiently developed prior to sampling. There was only one exceedance of the MCL during the second three quarters on which arsenic was detected at 0.051 mg/l in W-1 during the January 94 sampling episode.

There is evidence within the 104(e) data base that suggests that PRPs sent waste containing arsenic to the site. However, since there is insufficient data to conclude whether anthropogenic contribution of arsenic is statistically significant, a contingency has been developed that will address the migration of arsenic from the site or the treatment of arsenic that exceeds the MCL.

#### **6.1.3.2 Nature and Extent of Contamination**

Water quality has been determined from monitoring well sampling. There are 75 wells and piezometers that were drilled, and Geoprobe samples taken during the PA/SI and RI/FS. Ten wells

were drilled to determine the nature and extent of the LNAPL plume prior to the RI/FS. These wells are identified as CH-wells. Eight (8) monitoring wells were developed prior to the RI/FS. An additional 18 monitoring wells were developed during the RI/FS to supplement the existing monitoring wells. Thirty-nine (39) Geoprobe samples were taken during the course of the RI to determine the extent of contamination on the eastern portion of the Site. Thirteen (13) piezometers were drilled in January 1995 to supplement the FS work. The following discussion details the results of the sampling and analysis during the RI/FS and through August 1995.

During the first quarter, of 1993, concentrations of several organic and inorganic compounds were detected in groundwater in the wells sampled. The wells with the highest detected values are those located in or near the former tank farm/processing area. Consistent with previous data, wells' MW-7 and MW-6, as shown in Figures 6.1A and 6.1B, had detections of volatile organics, including vinyl chloride and benzene, above Maximum Contaminant Levels (MCL). The total organic solvents decreased from previous sampling episodes, while vinyl chloride levels increased, suggesting possible ongoing degradation of the solvent compounds to vinyl chloride. Isolated occurrences of metals compounds above MCLs were observed in several wells. These occurrences were unfiltered samples. Subsequent filtered metal samples were less concentrated leading to the conclusion that the construction of the wells may have disturbed the subsurface and released suspended particulates containing arsenic. No PCB compounds were detected in any of the groundwater samples. TEH was indicated in areas within the floating oil plume and in well W-1, which is locally impacted by diesel product.

Concentrations of several organic and inorganic compounds were detected in groundwater in the wells sampled during second and third quarter sampling in 1993. The wells with the highest detected values a those located in or near the former tank farm/processing area. Isolated occurrences of metals compounds above MCLs were observed in a few wells. The metals' samples were unfiltered and detections may be the result of suspended particulate. No PCB compounds were detected in any of the samples. TEH was previously reported in areas within the floating oil plume; however, it was undetected during third quarter sampling.

The results of Baseline Human Health Risk Assessment dated August 2, 1994, developed by CDM Federal Program Corporation on behalf of EPA, were derived from three quarters of data collected in 1993. The frequency of detection, range of detected concentrations, mean, standard deviation, upper 95% one-sided confidence limit, and exposure point concentrations from the three quarters of ground water data are shown on Table 6.1.3.2A. The vinyl chloride contamination is generally found in the

shallow aquifer at depths of 40 feet below ground surface (bgs). Other solvents, including cis-1,2-Dichloroethene can be found at depths of 160 feet bgs. COCs contributing to the risk of the site, for both the industrial and residential future scenarios, of the ground water include noncarcinogenic and carcinogenic constituents. The noncarcinogenic constituents include antimony, arsenic, beryllium, chloroform, cis-1,2-dichloroethene, manganese, mercury, nickel, silver and thallium (as chloride). The carcinogenic constituents include arsenic, benzene, benzo(b)fluoranthene, beryllium, chloroform, and vinyl chloride. The extent of the ground water contamination is shown on Figure 6.1.3.2 as defined by the level of risk under a residential scenario and applicable, relevant, and appropriate regulations (ARARs). The compliance boundary which delineates the present extent of the contaminated ground water plume shall be verified during remedial design of the response action.

The water quality data base has been expanded extensively since the development of the Risk Assessment. Water quality data was collected in January 1994 (4th Quarter), May 1994 (5th Quarter), and August 1994 (6th Quarter). The 4th, 5th and 6th quarter data were collected as part of the RI/FS. Table 6.1.3.2B lists the detection frequencies, minimums and maximums (e.g., range of detected concentrations), means and standard deviations for each of the chemicals of concern detected in these quarters. A comparison of the first three quarters (Table 6.1.3.2A) with the next three quarters (Table 6.1.3.2B) shows that there is a decrease in the mean concentration of antimony, arsenic, silver, thallium, benzene, vinyl chloride and benzo(b)fluoranthene and an increase in the mean concentration of beryllium, manganese, mercury, nickel, chloroform, and cis-1,2-dichloroethene.

Additional water quality data were collected to develop a better understanding of the hydrogeology and to determine the effectiveness of intrinsic remediation as a remedial alternative for ground water at the Site. Sampling occurred in different wells during the months of October 1994, November 1994, December 1994, January 1995, February 1995, March 1995, May 1995, and August 1995. Table 6.1.3.2C lists the detection frequencies, minimums and maximums (range of detected concentrations), mean, and standard deviation for arsenic and those organic chemicals that have the potential to be intrinsically remediated. A comparison of this data with the previous six quarters of data shows that the levels of vinyl chloride and arsenic contamination within the ground water plume have remained within the same order of magnitude. However, the high detections of arsenic and vinyl chloride that were detected in the first three quarters have not been repeated in the subsequent sampling events.

Twelve piezometers were drilled in the early months of 1995 for the specific purpose of determining whether biodegradation was occurring and subsequently quantifying the biodegradation rate.

The February 1995 sampling event of the offsite piezometer 12 (P-12) shows 1,1,1-trichloroethane (TCA) at 788 ppb which is above the MCL of 200 ppb. 12 is located approximately 400 feet northeast of the Site. Also, well W-4A exceeded the MCL for TCA during that same sampling event. The MCL for TCA was not exceeded in any of the wells in subsequent sampling events. The TCA does not appear to be originating from the Site. Thus, it is currently believed that it has an offsite source. The impact of the TCA upon, and potential connection to, the Site will be monitored during the Remedial Design (RD) and Remedial Action (RA).

#### **6.1.3.3 Volume Estimates**

The COCs contributing to the risk of the site, for the future residential scenario, of the ground water include noncarcinogenic and carcinogenic constituents. The noncarcinogenic constituents include chloroform, cis-1,2-dichloroethene, antimony, arsenic, beryllium, manganese, mercury, nickel, silver and thallium. The carcinogenic constituents include benzene, chloroform, vinyl chloride, benzo(b)fluoranthene, arsenic and beryllium.

The ground water preliminary remediation goals used to delineate the contaminated ground water plume are provided below:

- benzene - 0.005 mg/l
- chloroform - 0.1 mg/l
- cis-1,2-dichloroethene - 0.07 mg/l
- vinyl chloride - 0.002 mg/l
- benzo(b)fluoranthene - 0.0002 mg/l
- antimony - 0.006 mg/l
- arsenic - 0.05 mg/l
- beryllium - 0.004 mg/l
- manganese - 0.05 mg/l
- mercury 0.002 mg/l
- nickel 0.1 mg/l
- silver 0.05 mg/l
- thallium - 0.002 mg/l

The volume of ground water historically impacted has been estimated as approximately 17,000,000 gallons, assuming a maximum depth of impact of 45 ft below the water table.

Section 7.0  
Summary of Site Risks

## **Section 7.0 Summary of Site Risks**

A Baseline Human Health Risk Assessment was developed and finalized on August 2, 1994, by CDM Federal Programs Corporation on behalf of EPA. An Ecological Risk Assessment for the Site was developed and finalized in November 1994 by Woodward-Clyde on behalf of the Ekotek Site Remediation Committee (ESRC). The following describes the development and results of these studies.

### **Section 7.1 Human Health Risks**

CERCLA and EPA guidance delineates the role of the baseline risk assessment (BRA) in the Superfund remedy selection process. The BRA is initiated to determine whether the contaminants of concern at the site pose a current or potential risk to human health and the environment in the absence of any remedial action. A site conceptual model for the Petrochem/Ekotek site was developed and included potential current and future exposure pathways.

Carcinogenic and noncarcinogenic cumulative risk resulting from multiple contaminants, and/or multiple pathway exposure scenarios were evaluated. Section 5.0 discusses the data that was used for the quantification of the risk. In summary, the ground water risk is quantified from three quarters of data collected during the Remedial Investigation and the soils' risk is quantified from two phases of soil sampling events performed as part of the Remedial Investigation and soil data collected by FIT. All of the data used for quantification was validated. The evaluation of the risk involves the selection of the chemicals of concern; identification of an exposure (to include receptor and pathway); an assessment of the toxicity of the COCS; and a calculation of the risk for each COC and exposure pathway typically referred to as the risk characterization of the site.

#### **7.1.1 Chemicals of Concern**

COCS were selected from a list of all potentially site-related chemicals using specific guidelines developed by Region VIII EPA in the BRA. The list of potentially site-related chemicals included chemicals detected at least once in any site-specific sample from Phase I and Phase II of the RI. In addition, dioxin/furan data from surface soil samples collected prior to the RI by the field investigation team (FIT) were also included. Selection criteria were as follows:

- B Exceedance of background concentrations;
- B Essential nutrients;
- B Concentration and toxicity;
- B Detection frequency;
- B Mobility, persistence, and bioaccumulation;
- B Exceedance of applicable or relevant and



appropriate requirements (ARARs);

B Historical evidence; and

B Listed as a COC in more than one medium

COCS retained in surface soil under the future industrial scenario were thallium, PCBs, delta-BHC, endosulfan sulfate, endrin ketone, trichloroethene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benz(a)anthracene, dibenz(a,h)anthracene, dibenzofuran, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and TCDD (TEF, cancer).

COCS retained in ground water were antimony, arsenic, beryllium, manganese, mercury, nickel, silver, thallium, benzene, chloroform, cis-1,2-dichloroethene, vinyl chloride, benzo(b)fluoranthene, bis(2-chloroethyl)ether, 1,3-dichlorobenzene, 2-methylnaphthalene, naphthalene, and phenanthrene.

Chemicals that are not essential nutrients, and have no EPA-established health-based criteria to be used for toxicity screening, are included as COCS. Chemicals without EPA-established health-based criteria will not be evaluated quantitatively, but will be discussed qualitatively. This includes delta-BHC, endosulfan sulfate, endrin ketone, trichloroethene, bis(2-chloroethyl)ether, 1,3-dichlorobenzene, dibenzofuran, benzo(g,h,i)perylene, 2-methylnaphthalene, naphthalene, and phenanthrene.

### **7.1.2 Summary of Exposure Assessment**

#### **7.1.2.1 Current Exposure**

No current exposure pathways were evaluated, since no significant exposure to humans is occurring at the site. There are no wells in the aquifer directly beneath the Site and the groundwater is not used by residents or workers. Furthermore, access is limited to those performing the RI/FS, and Site access is restricted by a chain-link fence and periodic surveillance is conducted to monitor onsite activity.

#### **7.1.2.2 Potential Future Exposure**

Potential pathways by which humans could be exposed to COCS at, or originating from, the Petrochem/Ekotek site was identified and selected for evaluation. Future industrial and residential exposure scenarios were chosen for the site. The potential receptors and pathways of exposure selected for evaluation were as follows:

Industrial Worker:

B Ingestion of Surface Soil

- B Dermal Contact with Surface Soil
- B Ingestion of Ground Water
- B Inhalation of Fugitive Dust

#### Resident

- B Ingestion of Surface Soil
- B Dermal Contact with Surface Soil
- B Ingestion of Ground Water
- B Inhalation of Fugitive Dust
- B Dermal Contact with Chemical in Ground Water  
(Showering Scenario)
- B Inhalation of Airborne Vapors in Ground Water  
(Showering Scenario)

To evaluate exposures for each pathway, concentrations to which individuals might be exposed were estimated based on site-specific sampling data. An exposure point concentration was determined for each of the chemicals detected in any one of the multiple samples performed. The exposure point concentration was chosen as the lesser of the maximum detection and the upper 95% confidence limit on the mean. The approach used to estimate exposure assumptions followed EPA Superfund Guidance (EPA, 1989a) for risk assessments, in which EPA states that the risk assessment should evaluate Reasonable Maximum Exposures (RMEs) expected to occur. EPA states that the "intent of the RME is to estimate a conservative exposure case that is still within the range of possible exposures." For each exposure pathway, the Central Tendency Exposure (CTE) pathway, using average values for all exposure factors, was also estimated for comparison.

To estimate Chronic Daily Intakes (CDIs) for each pathway, scenarios were developed based on estimates regarding the extent, frequency, and duration of exposures. CDIs were estimated for each selected exposure pathway. CDIs were then used to predict the potential health risks associated with exposure to carcinogens and the potential for adverse noncarcinogenic effects.

### **7.1.3 Summary of Toxicity Assessment**

EPA has developed a standardized risk assessment methodology that can be used to evaluate potential carcinogenic risks and noncarcinogenic hazards or effects. In accordance with this guidance, toxicity values for carcinogenic and noncarcinogenic effects associated with exposure were collected from EPA sources (EPA 1993a, 1994). For carcinogens, the toxicity values are cancer slope factors (SFs). For noncarcinogens, the toxicity values are reference doses (RfDs).

Carcinogenic effects result in or are suspected to result in the development of cancer. EPA assumes a nonthreshold mechanism for carcinogens; that is any amount of exposure to a carcinogenic

chemical that poses a potential for generating a carcinogenic response in the exposed organism. EPA has developed a carcinogen-classification system using weight-of-evidence to classify the likelihood that a chemical is a human carcinogen. Chemicals are classified by EPA as:

- A Human carcinogen
- B1 Probable human carcinogen; limited human data are available
- B2 Probable human carcinogen; sufficient evidence in animals and inadequate or no evidence in humans
- C Possible human carcinogen
- D Not classifiable as to human carcinogenicity
- E Evidence of noncarcinogenicity for humans

Noncarcinogenic or systemic effects include a variety of toxicological end points and may include effects on specific organs or systems, such as the kidney, liver, lungs, etc. EPA believes that thresholds exist for noncarcinogenic effects.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of  $(\text{mg/kg-day})^{-1}$ , are multiplied by the estimated intake of a potential carcinogen, in  $\text{mg/kg-day}$ , to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes an underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of  $\text{mg/kg-day}$ , are estimates of the lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These

uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

#### 7.1.4 Summary of Risk Characterization

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where:

Risk = A unitless probability of an individual developing cancer (for example, one chance in 10,000 or  $1 \times 10^{-4}$ )

CDI = Chronic daily intakes averaged over 70 years (mg/kg-day)

SF = Slope factor (mg/kg-day)<sup>-1</sup>

Risks are probabilities that are generally expressed in exponential form ( $1 \times 10^{-4}$ ). An excess lifetime cancer risk of  $1 \times 10^{-6}$  indicates that as a reasonable maximum estimate, an individual has a one-in-1 million additional chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under specific exposure conditions at the Petrochem/Ekotek Site.

EPA uses the general  $1 \times 10^{-1}$  to  $1 \times 10^{-6}$  risk range as a "target range" within which the EPA strives to manage risks as part of a Superfund cleanup. Although waste management strategies achieving reductions in site risks anywhere within the risk range may be deemed acceptable by the EPA risk manager, EPA has expressed a preference for cleanups achieving the more protective end of the range (for example,  $1 \times 10^{-6}$ ). Furthermore, although EPA generally uses  $1 \times 10^{-4}$  in making risk management decisions, the upper boundary of the risk range is not a discrete line at  $1 \times 10^{-4}$ . A specific risk estimate less than  $1 \times 10^{-4}$  may be considered unacceptable based on site-specific conditions, including any remaining uncertainties about the nature and extent of contamination and associated risks.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (for example, a lifetime) with a reference dose (RfD) derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ).

The HQ is calculated as follows:

$$\text{Noncancer HQ} = \text{CDI/RfD}$$

where:

CDI = Chronic daily intakes averaged over the exposure  
Period (mg/kg-day)

RfD = Reference dose (mg/kg-day)

The CDI and RfD are expressed in the same units and represent the same exposure period (that is, chronic, subchronic or short-term).

If the CDI (exposure) is greater than the RfD, the HQ will be greater than one. An HQ greater than one indicates the potential for an adverse noncarcinogenic health effect from exposure to the chemical.

A Hazard Index (HI) is generated by adding the HQs for all COCs that affect the same target organ or system (for example, the liver or respiratory system) within a medium or across all media to which a given population may reasonably be exposed. If the HI for each toxic end point exceeds one, the potential for an adverse noncarcinogenic health effect from exposure to the medium is indicated.

A risk characterization based on the COC's exposure pathways and toxicity values was presented in the BRA. Toxicity values for COCs were combined with chemical exposure values to estimate quantitative health risk and hazard estimates for exposure to COCs at the Petrochem/Ekotek site. A summary of potential hazards and risks for the Petrochem/Ekotek site are shown on Table 7.1.4A for noncarcinogenic COCs and on Table 7.1.4B for carcinogenic COCs.

For noncarcinogens, EPA assumes that there is a level of exposure (i.e., the reference dose or RfD) below which it is unlikely that any adverse health effects will occur. If the exposure, or chronic daily intake (CDI) exceeds the RfD, i.e., if CDI/RfD is greater than one, there may be concern for potential noncancer hazards.

The overall HI estimated for the industrial worker reasonable maximum exposure (RME) scenario is 7.4. The overall HI estimated for the industrial worker CTE is 4.5. The overall HI estimated for the residential ground water ingestion scenario exposure (RME) is 26.6. The overall HI estimated for the residential CTE scenario is 11.2. The chemicals that are the major contributors to these noncarcinogenic hazards are arsenic and thallium in ground water, as shown in Table 7.1.4A.

The overall potential cancer risk posed by the site to the industrial worker RME scenario is  $3 \times 10^{-4}$ , and for the CTE

(which uses average values for all exposure factors) exposure scenario,  $4 \times 10^{-5}$ . The chemicals that are the major contributors to this cancer risk are arsenic and vinyl chloride in groundwater and, to a lesser extent, PARs and PCBs in soils.

The overall potential cancer risk estimated for the residential RME scenario is  $1 \times 10^{-3}$ , and for the CTE exposure scenario is  $1 \times 10^{-4}$ . The chemicals that are the major contributors to this cancer risk are arsenic and vinyl chloride in the ground water and, to a lesser extent, PARs and PCBs in soils. Potential cancer risk posed by residential use of ground water is slightly higher, with  $8 \times 10^{-4}$  for the RME scenario and  $1 \times 10^{-4}$  for the CTE scenario. The chemicals that are cited as the significant contributors to these risks are arsenic and vinyl chloride in ground water (Table 7.1.4B). These risk estimates are conservative and likely overstates the potential impacts to human health at the site, due to the use of the RME exposure and uncertainties associated with chemical toxicity studies.

The total site risks and hazards using the RME exposure exceed EPA's target range due to the potential for ground water ingestion. However, for the industrial land use scenario, the potential risks and hazards posed by site-wide surface soils (CTE and RME scenarios) are within EPA's target risk range ( $10^{-4}$  to  $10^{-6}$ , HI less than 1).

The BRA indicates that potential human health risks exist based on ingestion of ground water in the future, however, it is important to note that the ground water ingestion pathway is not currently complete. The risks identified are for future exposure should no actions be taken to prevent such exposure. The ground water beneath the site is recognized as a potential drinking water resource by the State because it is hydraulically connected to the primary drinking water source for Salt Lake City. The site area is currently served by municipal water supplies so there is no current exposure to the ground water beneath the Site.

#### **7.1.5 Uncertainty in the Risk Assessment**

Quantitative evaluation of chemical exposures for a risk assessment may be the greatest source of uncertainty in the risk assessment. Uncertainties from different sources may be compounded in the exposure assessment. To ensure that human health is adequately protected, the exposure assessment incorporates values that estimate potential exposures at the maximum levels that are reasonably expected (RME exposure), making the estimates conservative. For comparison, CTE exposure is also evaluated. Table 7.1.5 shows the main areas of uncertainty associated with the estimation of the chronic daily intakes (CDIs) and whether the uncertainty would lead to an overestimation and/or underestimation of the associated risks.

There are many uncertainties associated with the use of toxicological information in health risk assessments which are related to uncertainties intrinsic to the science of toxicology. Chief among these uncertainties is (1) the use of dose-response information from high-dose studies to predict adverse health effects at low doses; (2) the applicability of experimental animal studies to predict accurate health effects in humans; (3) the use of dose-response information from short-term exposure studies to predict adverse health effects of long-term exposures; (4) the use of toxicity values derived from homogenous animal populations or healthy human populations to predict adverse health effects in the general population which is likely to contain sensitive individuals; (5) quality of the study (i.e., design and conduct of the study); and (6) the selection criteria for the appropriate study in the development of toxicity values.

These and other uncertainties are limitations to the risk assessment process which cannot be resolved quantitatively given the current understanding of toxicology and human health and using current risk assessment methodology. These uncertainties are addressed in part by consistent application of conservative assumptions regarding the toxic effects of chemicals, such as uncertainty factors for RfDs and upper bound estimates for cancer SFs. Such procedures are intended to protect public health and are expected, in many cases, to overstate potential impacts on human health.

The main uncertainty associated with risk characterization is that some COCs retained in the BRA have no EPA-derived RfDs and SFs. These chemicals are delta-BHC, endosulfan sulfate, endrin ketone, trichloroethene, bis(2-chloroethyl)ether, 1,3-dichlorobenzene, dibenzofuran, benzo(g,h,i)perylene, 2-methylnaphthalene, naphthalene, and phenanthrene. Because these chemicals do not have numeric toxicity criteria, they are not included in the estimation of quantitative risks. The quantitative risks could be underestimated if these chemicals have adverse effects associated with them. The quantitative risk at the site may not be affected by excluding those chemicals without EPA-derived toxicity criteria because of the presence of arsenic, thallium, PCBs, vinyl chloride, and PAHs; these are the greatest contributors to carcinogenic and noncarcinogenic risks at the site. Another uncertainty associated with risk characterization is summing across chemicals with different mechanisms of action and different end points.

## **7.2 Summary of Environmental Risks**

A baseline ecological risk assessment (ERA) was conducted to evaluate potential risks to ecological receptors exposed to chemicals detected in surface soils at the Petrochem/Ekotek site. Site-specific data used in the preparation of the ERA included surface soil data collected during the RI; tissue sample data of

pigeons collected at the site and direct biological observations of the ecological habitats and site biota. Using these data, an ecological conceptual site model was developed to identify how and where chemicals are likely moving and what animals may be exposed to site-related chemicals. Two groups of animals were selected as representative of potential receptors: a subpopulation of migratory birds that are Federally-protected and found in the immediate vicinity of the site; and the Federally protected peregrine falcon pair that between 1991 and 1994 nested in a quarry near the site. Onsite migratory birds may be exposed to chemicals in the soil through direct contact or incidental ingestion of soil if onsite feeding occurs. The peregrine falcon may be exposed to site-related chemicals by eating birds such as pigeons that roost on the site and that may have accumulated soil chemicals in their tissues; the peregrines are not directly exposed to surface soil chemicals since they typically capture their prey in flight.

### **7.2.1 Chemicals of Concern**

Fifty-five chemicals were identified as ecological COCs for the migratory birds, and two chemicals (thallium. and dioxins/furans) were identified as ecological COCs for the peregrine falcon, using COC selection criteria agreed upon with EPA. The selected sets of COCs were evaluated for possible risk to the ecological receptors by comparing their concentrations in soil and pigeon tissues to conservative toxicity reference values (TRVs) that were based on toxicity values for each chemical compiled from the readily available literature. Literature values for the COCs were selected using two EPA-approved criteria - lowest toxicity value for a bird species, or lowest toxicity value for any other species if no bird data were available for that chemical.

### **7.2.2 Characterization of Risk**

Potential risks to the migratory birds and peregrines were characterized using a two-step process - a risk screening using conservative assumptions, and a risk assessment of those COCs that remained after the risk screening and required additional evaluation using more representative site-specific exposure assumptions. The screening conservatively assumed that the migratory birds and pigeons feed only at the Petrochem/Ekotek site (although it has been documented that feeding actually occurs on spilled cereal grains at the adjacent railyard); that the peregrines feed only on birds from the site (disregarding the feeding range); that the exposure point concentration (EPC) represents soil concentrations throughout the site; that 100 percent of the RME soil concentrations are bioavailable to the birds; and that 11 percent of the diet of migratory birds is soil. The risk screening indicated that onsite concentrations of five chemicals, including benzo(a)pyrene (B(a)P), PCBs, beryllium, thallium and dioxins/furans, exceeded their TRV doses



for migratory birds. These five COCs were further evaluated. The Screening also indicated that the COCs for peregrine falcons were less than their TRVs and thus are unlikely to present a substantial chronic or acute risk to the falcons.

The risk evaluation for the five COCs that exceeded the screening levels using the conservative exposure assumptions was conducted using a more representative assumption which was that soil constitutes a lower percentage (6.8 percent) of diet in migratory birds. With this minor adjustment, beryllium and PCBs were eliminated as posing any potential substantial risk to migratory birds (Table 7.2.2).

### **7.2.3 Uncertainty in the Risk Assessment**

In the uncertainty analysis, when three of the conservative assumptions (fraction of soil in diet, chemical bioavailability, and exposure duration) were made more representative of site conditions, it was found that only B(a)P exceeded its long term TRV and therefore may present a substantial chronic risk to onsite migratory birds. When a fourth exposure assumption (soil exposure concentration) was changed from an EPC to an arithmetic mean concentration, it was determined the B(a)P did not exceed its long term TRV dose.

Section 8.0  
Description of Remedial Alternatives

## **Section 8.0**

### **Description of Remedial Alternatives**

A Feasibility Study (FS) was conducted to develop and evaluate remedial alternatives for soils (to include buried debris), LNAPL and ground water. Several alternatives were assembled from the applicable remedial technology process options and were screened for their effectiveness, implementability and cost. The alternatives passing this screening were then evaluated in further detail based on the nine criteria required by the NCP. This section provides a description of each alternative that was retained for the detailed screening analyses in the FS. The no further action alternative, required by the NCP, was evaluated against the nine criteria to provide a point of comparison for the other alternatives.

The selected remedy for the Site must adequately reduce or eliminate the risks to human health and the environment. Actual or threatened releases of hazardous substances from the Site, if not addressed by the preferred alternative or other measures considered, may present a current or potential threat to public health, welfare, or the environment. The EPA has developed chemical-specific cleanup goals for the Site. These objectives and goals define acceptable levels of risks. The cleanup goals include prevention of human exposure to contaminants and prevention of offsite migration of contaminants in excess of the cleanup goals. These goals were based on the results of the Baseline Risk Assessment (BRA) and an evaluation of the Applicable or Relevant and Appropriate Requirements (ARARs) specified in Federal and State environmental laws and regulations. Both the objectives and goals were analyzed to identify the selected alternative. In addition, the EPA's detailed analysis considered ten remedial alternatives, including the "No Further Action" Alternative (#1). The EPA is required to evaluate a no action alternative in order to provide a basis for comparing the benefits of other alternatives.

### **Section 8.1 Remedial Action Objectives**

Remedial Action Objectives (RAOs) are general descriptions of goals for protecting human health and the environment at a site, and are accomplished through remedial actions. If the goals have already been satisfied, then no action is warranted. If the goals are not being met, remedial actions may be required. RAOs identify the media of concern, chemicals of potential concern, acceptable contaminant levels or ranges of contaminant levels for protecting human health and the environment, and exposure routes and receptors.

In the development of the, RAOs, the industrial workers' exposure and residential ground water exposure were considered. The RAOs

identified for the Petrochem/Ekotek Site are as follows:

#### Soils

- Protect industrial workers from direct dermal contact or ingestion of onsite surface soils containing COCS in excess of the PRGs; and
- Protect industrial workers from inhalation of airborne particulate matter from onsite surface soils containing COCs in excess of the Preliminary Remediation Goals (PRGs).

#### Ground Water

- Protect human health from ingestion of onsite ground water that contains chemicals that exceed the PRGs; and
- Protect human health from dermal contact with and inhalation of airborne vapors from onsite ground water that contains chemicals that exceed the PRGs.

#### Surface Water

- Protect water quality of surface water bodies located northwest of the site from site-related impacts.

### **Section 8.2 Background Consideration**

Many of the chemicals identified as COCS in the human health BRA are present in the Salt Lake City area, as naturally-occurring chemicals either in soil and ground water, or as anthropogenic chemicals caused by over a century of urban and industrial development. As stated in EPA Risk Assessment Guidance for Superfund (EPA, 1989), "a comparison of sample concentrations with background concentrations is useful for identifying the non- site-related chemicals that are found at or near the site." The BRA for human health considered soil background, and eliminated a number of chemicals on the basis of statistical comparison of site concentrations to offsite concentrations. However, the BRA did not compare onsite concentrations of contaminants within the groundwater to offsite ground water, on the basis that an insufficient number of offsite reference samples existed to make a meaningful statistical comparison to three quarters of monitoring data. EPA believes that arsenic is a naturally-occurring (background) constituent in ground water in the Salt Lake area, however, an actual mean background concentration is difficult to select based on variability in arsenic across the region, but appears to be below the Maximum Contaminant Level (MCL) of 0.05 mg/l. Arsenic has been detected above the MCL on three occasions within the first three quarters of ground water data in two site wells. The arsenic detections in these quarters

were from unfiltered samples. Filtered inorganic samples taken after complete development of the wells show arsenic concentrations below the MCL. EPA believes that the detections of arsenic above the MCL in the first three quarters may be attributed, in part, to suspended matter in the samples, since the wells were insufficiently developed prior to sampling. There was only one exceedance of the MCL during the second three quarters on which arsenic was detected at 0.051 mg/l in W-1 during the January 94 sampling episode.

There is evidence within the 104(e) data base that suggests that PRPs sent waste containing arsenic to the site. Since there is insufficient data to conclude whether the anthropogenic contribution of arsenic is statistically significant, a contingency has been developed that will address the migration of arsenic from the site or the treatment of arsenic that exceeds the MCL.

### **Section 8.3      Hot Spot Areas and Preliminary Remediation Goals**

#### **8.3.1    Soil Hot Spots**

The range of soils alternatives were developed to address the remedial action objectives. Hot spots were identified as localized areas that contain elevated COC concentrations above an excess cancer risk of  $10^{-4}$  or HI=1. The soil COC remediation levels used to identify hot spots are provided below:

- Benzo(a)anthracene - 780 mg/kg;
- Benzo(a)pyrene - 78 mg/kg;
- Benzo(b)fluoranthene - 780 mg/kg;
- Dibenz(a,h)anthracene - 78 mg/kg;
- Indeno(1,2,3-c,d)pyrene - 780 mg/kg;
- PCBs - 15 mg/kg;
- 2,3,7,8-TCDD(TEF) - 0.186 ug/kg; and
- Thallium - 160 mg/kg

Based on these levels, estimates for risk-based hot spot areas and volumes were developed. The areas containing hot spot soil cover 700 square yards (sy) with a corresponding volume of 200 CY, as shown in Figure 6.1.1.3.A.

Soils that exceeded a total petroleum hydrocarbon (TPH) reading of 100,000 ppm were also considered hot spot areas. Removal and treatment of TPH hot spots addresses EPA concerns. Areas of known TPH hot spots include the volume beneath the metal warehouse on the northeast portion of the site (to a depth of 1 ft)(40 CY) and near the concrete loading ramp on the eastern portion of the site (90 CY), as shown on Figure 6.1.1.3.A.

Soils beneath the Main Warehouse building (to the water table)

and beneath the metal warehouse on the northeast portion of the site (to a depth of 1 ft) were assumed to exceed the hot spot criteria and may also be included as hot spot areas. Since this is an assumed estimate not based on actual field data, this volume will not be addressed by any of the remedial alternatives.

The total volume of soils identified as hot spot areas for the site, to include an assumed volume, is 3300 CY. The remedial alternatives only address the estimated hot spot volumes from field data which is a total of 330 CY.

### **8.3.2 Soil Preliminary Remediation Goals (PRGs)**

PRGs were developed for the COCS which were evaluated quantitatively in the human health BRA, for surface soil under the industrial scenario, in accordance with EPA guidance for PRG development (EPA, 1991b). The PRGs for soil were developed by considering the results of the BRA, background conditions, ARARs, and analytical technology (i.e., detection limits).

Available analytical technology should be capable of detecting the concentrations identified as PRGs. Therefore, analytical technology was not a factor in the modification of the PRG numbers.

Risk-based concentrations, toxicity values and exposure parameters were used to calculate excess cancer risk levels of  $10^{-6}$  and hazard quotients. The PRGs for soils are contaminant levels that exceed the excess cancer risk level of  $10^{-6}$  or exceed the noncarcinogenic hazard index of one for an industrial exposure.

The soil COC remediation levels used to identify PRGs are provided below:

- Benzo(a)anthracene - 7.8 mg/kg;
- Benzo(a)pyrene - 0.78 mg/kg;
- Benzo(b)fluoranthene - 7.8 mg/kg;
- Dibenz(a,h)anthracene - 0.78 mg/kg;
- Indeno(1,2,3-c,d)pyrene - 7.8 mg/kg;
- PCBs - 0.15 mg/kg;
- 2,3,7,8-TCDD(TEF) -  $1.86 \times 10^{-6}$  mg/kg; and
- Thallium - 160 mg/kg

### **8.3.3 Ground Water Remediation, Goals (PRGs)**

PRGs were developed for the COCS which were evaluated quantitatively in the human health BRA, for ground water under the residential scenario in accordance with EPA guidance for PRG development (EPA, 1991b). The PRGs for ground water were developed by considering the results of the BRA, background conditions, ARARs, and analytical technology (i.e., detection

limits).

Arsenic is a ubiquitous background constituent in ground water in the Salt Lake Valley. However, since the regional average concentration is less than the MCL for arsenic for the shallow aquifer, the MCL of 0.05 mg/l was selected as the PRG.

The chemical-specific remediation standards are applicable to site ground water. MCLs, promulgated under Federal and State statutes, have been selected as PRGs for ground water. MCLs are risk-based, and as stated in the NCP, "the MCL generally will be the cleanup level where relevant and appropriate."

Available analytical technology should be capable of detecting the concentrations identified as PRGs. Therefore, analytical technology was not a factor in the modification and development of the PRGs.

Risk-based concentrations, toxicity values and exposure parameters were used to calculate excess cancer risk levels of  $10^{-6}$  and hazard quotients. The PRGs for ground water are contaminant levels that exceed the excess cancer risk level of  $10^{-6}$  or exceed the noncarcinogenic hazard index of one for a residential exposure.

The ground water COC remediation levels used to identify PRGs are provided below:

- benzene - 0.005 mg/l
- chloroform - 0.1 mg/l
- cis-1,2-dichloroethene - 0.07 mg/l
- vinyl chloride - 0.002 mg/l
- benzo(b)fluoranthene - 0.0002 mg/l
- antimony - 0.006 mg/l
- arsenic - 0.05 mg/l
- beryllium 0.004 mg/l
- manganese 0.05 mg/l
- mercury 0.002 mg/l
- nickel 0.1 mg/l
- silver - 0.05 mg/l
- thallium - 0.002 mg/l

The remediation goal for manganese is based on the Utah Secondary MCLs for Drinking Water, Utah Administrative Code R309-103-3.

#### **Section 8.4 ARARs**

Section 121(d)(2) of CERCLA, 42 U.S.C. § 9621(d)(2), provides that for "any hazardous substance, pollutant or contaminant that will remain onsite . . . the remedial action selected . . . shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or

contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation." Thus, this section of CERCLA requires that applicable and relevant and appropriate requirements (ARARs) be identified and attained during the development and implementation of remedial actions. For contaminants that will be transferred offsite, Section 121(d)(3) of CERCLA requires that the transfer be to a facility which is operating in compliance with applicable federal and state laws. Offsite activities contemplated under each alternative must comply with the Revised Procedures for Implementing Offsite Response Actions, OSWER Directive 9834.11, dated November 13, 1987 (the "Offsite Policy").

Onsite actions need comply only with the substantive aspects of ARARs, not with the corresponding administrative requirements, unless otherwise specified. Permit applications and other administrative procedures such as administrative reviews and reporting and record keeping requirements are not considered ARARs for actions conducted entirely onsite. Offsite actions must comply with all legally applicable requirements, both substantive and administrative.

"Applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. State standards that are more stringent than Federal requirements may be applicable. Applicable requirements must be met to the full extent required by the law, unless a waiver applies and is granted.

"Relevant and appropriate" requirements are those cleanup standards, standard of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, or contaminant at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to the particular site. State standards that are more stringent than Federal requirements may be relevant and appropriate.

EPA's guidance classifies ARARs into three types: chemical-specific, action-specific, and location-specific requirements. Chemical-specific requirements are health-, risk-, or technology-based values that establish an acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Action-specific requirements are performance- or activity-based requirements or limitations on actions taken with respect to hazardous substances. Action-specific requirements set controls on particular kind of activities related to the



management of hazardous substances, pollutants, or contaminants. Location-specific requirements are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

While ARARS are promulgated, enforceable requirements, other types of information may be useful for designing the remedial action or necessary for determining what is protective of public health or the environment. Nonpromulgated advisories or guidance issued by the Federal or State government that provides useful information is termed criteria "to be considered" (TBC). TBCs will be considered along with ARARS in determining the necessary levels of cleanups and are enforceable when selected as part of the remedy.

The remedial alternatives' presented for detailed analysis in the FS were assessed to determine whether they would attain applicable or relevant and appropriate requirements under Federal environmental and State environmental and facility siting laws or provide grounds for invoking an ARARS waiver.

With the exception of the No Further Action Alternative, each of the alternatives meets ARARS. Alternatives 4, 7, and 8 addressed groundwater contamination with active treatment technologies. The other alternatives relied upon intrinsic remediation/attenuation and have contingency measures included ensuring ARARS are met.

The list of ARARS pertinent to each of the alternatives considered is presented in Table 8.4. Table 8.4 provides a listing of each of the "chemical-," "action-," or "location-specific" Federal and State requirements and a notation of whether they are applicable or relevant and appropriate for each of the alternatives.

A more detailed discussion of the ARARS and TBCs that apply to the selected remedy is provided in Section 10 of this ROD. Where two or more ARARS are pertinent to a particular hazardous substance, pollutant or contaminant, media, or remedial action, the more stringent shall apply. For those hazardous substances for which an ARAR exists for a specific media, the ARAR is the performance standard that must be met unless the risk-based cleanup standard is more stringent.

#### **Section 8.5 Intrinsic Remediation/Attenuation of Ground Water**

Studies were initiated during And after the completion of the FS to collect data to determine whether anaerobic biological activity is occurring at the site and to quantify the biodegradation rate of the organic compounds, with emphasis on vinyl chloride, in the shallow aquifer beneath the

Petrochem/Ekotek site. The final FS and the Aquifer Characterization Report (developed by RUST Environment & Infrastructure on behalf of ESRC) detail the results from these studies. The studies show that geochemical conditions are generally favorable at the site, however, data were not collected in these studies to demonstrate conclusively that vinyl chloride is degrading to the less toxic constituents of ethane and ethene. The Aquifer Characterization Report also showed that there is an offsite plume of 1,1,1-trichloroethane (TCA) that is migrating from the east to the north of the Petrochem/Ekotek site. It is unknown at this time if the TCA is commingling with the contaminants in the ground water beneath the Petrochem/Ekotek site or if the TCA is degrading to more toxic constituents or if the off-site plume is migrating on a course that bypasses the Site without commingling with the on-site plume. A monitoring program is included as a common feature of all the alternatives to identify the impacts of this plume upon the remediation of the onsite contaminated ground water at the Petrochem/Ekotek site.

For intrinsic remediation to be effective, the naturally-occurring hydrogeochemical conditions at the site must allow the rate of biodegradation to be faster than the rate of contaminant migration.

To determine whether bioremediation is occurring or the rate at which a biodegradation is occurring at the site, the capacity of the indigenous microorganisms to metabolize the contaminants must be documented through field testing. The effectiveness of intrinsic remediation must be proven with a site monitoring program to confirm the progress of contaminant biodegradation. Chemical analyses of contaminants, final electron acceptors and/or other reactants and products indicative of biodegradation processes, need to be performed. Laboratory microcosm studies can also be performed.

Three lines of evidence can be used to demonstrate that intrinsic remediation of vinyl chloride is feasible at the Site. These include (1) documenting the loss of vinyl chloride from field samples, (2) providing evidence that the potential for vinyl chloride biodegradation is actually realized in the field at the site, and (3) conducting laboratory studies to confirm that vinyl chloride biotransformation is possible in field samples. This approach for evaluating intrinsic remediation follows the recommendations of the Committee on *In Situ* Bioremediation under the National Research Council (1993). Additional data collection and studies shall be conducted to further substantiate vinyl chloride intrinsic remediation at the site.

Previously collected data, including the data described in the Aquifer Characterization Report, demonstrates that geochemical conditions are generally favorable at the site for biodegradation of organic compounds.

In the vicinity of the LNAPL the redox potential measurements for ground water (wells CH-3, MW-5, MW-6, and MW-7) range from -108 to -290 mV which indicated conditions are strongly reducing. Such strongly reducing conditions are consistent with the large source of organic materials from the LNAPL being available as substrate for biological processes to deplete oxygen and create anaerobic conditions. Furthermore, the installed cover at the land surface above the region of LNAPL helps to foster anaerobic conditions in the LNAPL region by eliminating the influx of oxygen from infiltration of precipitation. The sealed land surface helps to create anaerobic conditions in the underlying ground water.

The low to highly negative values of the redox potential, the lower values of nitrate-N, and the presence of sulfate and organic carbons are indicative of anaerobic biological processes that are typical of sulfate reduction and/or methanogenesis. These latter conditions are favorable for reductive dechlorination of chlorinated solvents including vinyl chloride. Consequently, the redox potential and electron acceptor data at the site are consistent with conditions known to be necessary for vinyl chloride biodegradation.

Additional data collection is required as part of the intrinsic remediation remedy to demonstrate quantitatively that vinyl chloride is degrading to the less toxic constituents of ethane and ethene. ESRC agreed to collect qualitative data to determine whether ethane and ethene can be detected in the field and initiated collection of this data in November 1995. If the results of this data collection render detections of ethane and ethene, further studies shall be initiated as part of the intrinsic remediation remedy to quantify the rate of degradation of vinyl chloride to ethane and ethene.

Discussions between EPA and ESRC have developed an approach at the Petrochem site to quantify the degradation of vinyl chloride to ethane and ethene through the use of a tracer test. The tracer test involves the following steps:

- (1) Develop a better 3-D picture of contaminant distribution which would assist in the design and implementation of a tracer test. The purpose is to determine if there are layers of high vinyl chloride concentration and to more accurately determine the depth at which VC resides, especially in relation to the geothermal water. This would involve sampling at multiple depths within the aquifer, using an ultra-low flow sampling pump, to sample discrete aquifer intervals, coupled with downhole flow meter measurements. This discrete sampling approach and flow monitoring at various depths within the well would define if there are zones or intervals of varying flow

rate and contaminant distribution. The sampling method would minimize any vertical flow in the borehole. The suggested sampling and flow monitoring would be done for a subset of existing wells. A number of two to five has been suggested by ESRC, however, the quality of the data will determine whether this number is adequate.

(2) Perform a tracer test. The purpose of the test would be to monitor the behavior of vinyl chloride relative to a conservative tracer such as bromide. The test would be completed using a tight horizontal and vertical grid or array of temporary Geoprobe points so that the exact flow direction and degree of dispersion/mixing that are occurring in the area of the plume can be defined. A conservative tracer would be injected upgradient using an existing well. The tracer test results would then be used to normalize the vinyl chloride data, so that vinyl chloride breakdowns could be accurately tracked.

A more specific work plan shall be developed by the Responsible Parties performing the remedial design that will provide details as to how the objective of quantifying the degradation rate of vinyl chloride to ethane and ethane will be performed during RD/RA. The description of the tracer test is provided in this ROD to reflect the scope of the discussions conducted to date and to use as an example of the level of effort required to quantify the degradation of vinyl chloride. The objective of quantifying the ethane and ethane shall be conducted to define the degradation rate of vinyl chloride and associated remediation periods supporting the selection of intrinsic remediation for the ground water. The actual methods and details of how that objective can be accomplished are evolving so that the specific work plan may differ in the detail provided in this ROD.

If biodegradation of the vinyl chloride to ethane and ethane cannot be quantified, or if the rates are inadequate to meet the criteria specified in this ROD, as determined by EPA, then the selection of intrinsic remediation as a remediation of the ground water for the Petrochem/Ekotek site will be reevaluated by EPA and modifications or initiation of contingency measures may be deemed by EPA as necessary to be protective of human health and the environment.

## **Section 8.6 Features Common to All Remedial Alternatives**

Excluding the No Further Action Alternative, each alternative includes the following common elements:

- **Removal and Treatment of LNAPL:** Oily liquid wastes will be removed by direct excavation and pumping/skimming of

liquids. The approximate volume of waste removed (and more specifically, the approximate percentage) and treated varies within the different alternatives; and is dependent upon the actual field volume, feasibility and cost effectiveness of removal in the field. The liquid waste will be removed for offsite thermal destruction (wastes will be heated via incineration until contaminants are destroyed) at a permitted facility. Soils saturated with oily liquids will either be thermally treated onsite (contaminants will be heated until they evaporate, or are "desorbed," and subsequently are destroyed), or disposed offsite in an appropriate landfill. Each alternative can be implemented in 3 years or less.

- **Performance and Compliance Monitoring:** A performance and compliance monitoring program will be developed for both the soils (to include buried debris) and ground water (to include LNAPL) media. A long-term ground water monitoring plan will be developed to ensure that onsite contaminated ground water is not migrating from the site (i.e., beyond the compliance boundary) and to determine the impacts of the off-site TCA plume upon the remediation of the onsite contaminated ground water. The compliance boundary shall be further delineated during the remedial design (RD). The frequency of the monitoring and contaminants to be monitored will be determined during RD but will occur at least once each year for 30 years or until the site contaminants meet the performance standards or indefinitely if the remedy has a containment component.
- **Tank Farm Components Removal:** The liner, concrete wall and slab, and two tanks (1,000 gallons each) will be removed from the former tank farm area for disposal in a TSCA, hazardous or solid waste permitted landfill. Approximately 600 CY of soils excavated during the tank removals will be thermally desorbed with other soils onsite or disposed offsite in either a TSCA, hazardous or solid waste landfill.
- **Building Demolition:** Two or more of the existing buildings on the site will be demolished because they are directly above or partially above the LNAPL plume and debris area. Demolition wastes will be removed from the site for appropriate treatment and/or disposal.
- **Institutional Controls:** Institutional controls are nonengineering methods by which Federal, State, local governments, or private parties can prevent or limit access to or use of a site. Institutional controls for the Petrochem/Ekotek Site shall include, but not be limited to, zoning controls; onsite-access restrictions including, but not limited to, fencing and warning signs; and well restrictions. Offsite institutional controls shall serve as

an additional measure of protection to enhance the effectiveness of the selected remedy and to act as preventive measures to preserve the implementability and effectiveness of any of the selected remedy contingency measures. Offsite institutional controls shall include, but not be limited to, deed notices and restrictions, water use restrictions, zoning controls, and well restrictions. These controls must prohibit all on- and off-site activities on or in the vicinity of the Petrochem/Ekotek site that would interfere or be incompatible with or that would in any way reduce or impair the effectiveness or protectiveness of the selected sitewide remedy. All onsite and offsite institutional controls shall be adequately administered, maintained, and enforced.

- **Five-Year Reviews.** As specified in Section 121(c) of CERCLA, as amended by SARA, and Section 300.430(f)(4)(ii) of the NCP, EPA will review the remedy no less often than every 5 years after the initiation of the remedial action to assure that human health and the environment are being protected by the implemented remedy (this review will ensure that the remedy is protective and that institutional controls necessary to ensure protections are in place). An additional purpose for the review is to evaluate whether the performance standards specified in this ROD remain protective of human health and the environment. In accordance with CERCLA and EPA guidance, EPA will continue the reviews if hazardous substances, pollutants, or contaminants remain at the Petrochem/Ekotek Site.

## **Section 8.7 Contingency Measures**

Two contingency measures have been developed to ensure the protectiveness of the remedies.

### **8.7.1 Contingency Measure for Containment.**

The contingency measures for containment addresses concerns regarding the potential for either offsite migration of the organic plume or the ineffectiveness of the intrinsic remediation alternative or both. This contingency provides containment, control and treatment of the dissolved ground water plume.

The contingency includes ground water extraction, treatment of contaminated ground water (if necessary: the POTW may be capable of accepting the untreated contaminated ground water), and discharge to the POTW. This contingency includes the placement/installation of wells at the compliance boundary for the purposes of pumping the ground water at rates that would ensure capture of the migrating plume and pretreatment, if necessary, prior to discharge to the POTW. The exact locations and number of the ground water wells will be determined during

the remedial design of the selected remedy, as approved by EPA. The suggested treatment component includes a UV oxidation system which shall be located onsite, as described in alternative 8. Other treatment technologies may be evaluated if the site conditions trigger the implementation of the containment contingency measure. Treatment standards will be dictated by the requirements of the POTW.

The criteria for triggering implementation of the containment contingency is either (a) a documented, consistent and verifiable increase, as determined by EPA, in contaminant concentrations exceeding the ground water PRGs at or beyond the compliance boundary, which indicates that the remedy is not managing the waste within the current extent of the contaminated plume or (b) the documented ineffectiveness, as determined by EPA, of the remedy to affect the specified reduction in contaminant mass. The criteria will be further and more specifically developed and described in the remedial design.

The estimated cost of this contingency measure ranges from \$200,000 to \$3,400,000 for a range of operating time from 0 to 30 years. Based on available existing data, the measure would not be triggered, so the operating time is 0 years. However, to allow for the worst case situation of persistent offsite plume movement, the costs for a 30-year operating time have also been estimated.

#### **8.7.2 Contingency Measure for Arsenic Remediation.**

The contingency measure includes ground water extraction, water treatment, if necessary, and discharge to the POTW. The contingency measures for arsenic remediation addresses the concern regarding the potential for exceedance of arsenic above its MCL of 0.05 mg/l within the plume or migration of ground water above the MCL beyond the compliance boundary.

This contingency would be combined with all ground water alternatives discussed in this ROD, with the exception of the No Further Action alternative, if arsenic exceeds the MCL beyond the compliance boundary. This contingency includes the placement/installation of wells at the compliance boundary for purposes of pumping the ground water at rates that would ensure capture of the migrating plume and pretreat, if necessary, prior to discharge to the POTW. The exact locations and number of the ground water wells will be determined during the remedial design of the selected remedy.

The contingency measure also applies within the plume when, as determined by EPA, the exceedances of arsenic above the MCL are demonstrated to be above natural background; the concentrations and consistency of detections of arsenic above the MCL are statistically significant; and the effectiveness and the cost of

the pump and treat system justify the reduction of risk as determined by EPA. The statistical method, to be approved by EPA, which shall be employed to determine statistically significant data will be developed as part of the Compliance Monitoring Program during remedial design of the remedy.

Treatment shall be conducted on all contaminated ground water that exceeds the requirements of the POTW. Treatment for removing arsenic from groundwater uses activated alumina adsorption (also known as gamma aluminum oxide, a porous adsorbent with a moderately high surface area). Treatment will occur onsite, although based on the existing site POTW discharge permit, as an arsenic standard is not specified. Inclusion of the onsite treatment component for arsenic, as part of this contingency measure, allows for discharge to the POTW.

The criterion for triggering implementation of the contingency at the compliance boundary is either (a) a documented, consistent and verifiable increase, as determined by EPA, in contaminant concentrations exceeding the MCL at or beyond the compliance boundary, which indicates that the remedy is not managing the waste within the current extent of the contaminated plume or (b) exceedances of arsenic above the MCL within the plume a demonstrated, as determined by EPA, to be above natural background; the concentrations and consistency of detections of arsenic above the MCL are statistically significant; and the effectiveness and the cost of the pump and treat system justify the reduction of risk as determined by EPA. The criteria will be further and more specifically developed and described in the remedial design.

The estimated cost of this alternative ranges from \$300,000 to \$3,600,000 for a range of operating time from 0 to 30 years. Based on site data available, the alternative would not be triggered, so the operating time is 0 years. However, to allow for the worst case situation of a statistically significant occurrence of arsenic above the MCL, costs for the 30-year operating time have also been estimated.

## **Section 8.8 Description of Past Actions**

### **8.8.1 Emergency Removal Action**

In August 1989, surface removal activities were initiated by the ESRC in accordance with the AOC for Removal by the ESRC's contractor Chemical Waste Management (CWM) with oversight by the EPA's Emergency Response Branch. The removal activities included removal of tanks, containers, sludges, and liquids; and storm water management.

As an addendum to the AOC for Removal, USPCI (replacing CWM) conducted the demolition and removal of the aboveground tanks,



equipment, and facilities in the processing area, main tank farm, and east tank farm, and continued storm water management. The removal of pipe from the main tank farm began in June 1991 and was completed on July 25, 1991; and the demolition of the tank farms began in September 1991 and was completed in November 1991.

The ground surface in the area where the processing equipment and tank farms were located was covered on an interim basis in February 1992 with a geosynthetic liner held in place with sand bags. The liner minimizes infiltration to prevent contamination of storm water runoff from the site.

#### **8.8.2 State Underground Storage Tank (UST) Removal**

Three USTs were removed from the site by USPCI in September 1991 (USPCI, 1992). A site assessment and closure plan detailing the removals was prepared by USPCI in January 1992. A fourth UST was removed in March 1992. Figure 8.4.2 shows the locations of the USTs removed.

### **Section 8.9 Description of Alternatives**

A Feasibility Study (FS) was conducted to develop and evaluate remedial alternatives for soils (to include buried debris area), and contaminated groundwater at the Petrochem/Ekotek Site. Remedial alternatives were assembled from applicable remedial technology process options and were initially evaluated for effectiveness, implementability, and cost. The alternatives passing this screening were then evaluated based on nine criteria required by the NCP. In addition to remedial alternatives, the NCP requires that a no action alternative be considered at every site. The no action alternative serves primarily as a point of comparison for other alternatives.

Following the development of the alternatives in the FS, ten remedial alternatives (including the no action alternative) remained for the detailed analysis evaluation. These alternatives are described below with the original alternative numbering sequence from the FS report and the Proposed Plan. Table 8.9 identifies the final disposition of the contaminated soils for all the alternatives.

#### **8.9.1 No Further Action Alternative (Alternative 1)**

The no further action alternative must be evaluated for baseline comparison as part of the Feasibility Study process. Under this alternative, remediation goals would not be met because no remedial action would be undertaken to treat, contain, or remove contaminated media which exceed the performance standards. The collection and removal of runoff from the tank farm liner to the POTW would cease. The liner, retaining wall and underground tanks would be allowed to deteriorate. Ground water monitoring

would also cease and no action would be taken to prevent migration of contaminants. No institutional controls would be implemented to restrict access to the Petrochem/Ekotek site or to restrict exposure to contaminants.

There would be no reduction of toxicity, mobility, or volume (TMV) associated with site soils (to include buried debris) or LNAPL. Intrinsic bioremediation is expected to reduce the TMV in the contaminated ground water.

There would be no treatment or containment components associated with this alternative. Under the No Further Action Alternative, all waste would be left in place and there would be no reduction in risk. The remedial action objectives (RAOs) would not be met for this alternative because contaminants would migrate, and protection of human health and the environment would not be achieved.

Because there are no actions under the No Further Action Alternative; chemical-, location-, and action-specific ARARs would not be met.

Five-year reviews would be conducted.

All actions under the No Further Action Alternative has already been implemented.

The total 30-year present worth cost of this alternative is \$900,000 with a capital cost of \$960,000 and no annual O&M costs.

#### **8.9.2 Excavate and Treat Soil Rot Spot Areas and Partially Excavate and Treat Soils that Exceed Soil PRGs; 75% LNAPL Removal/Treatment; Contain Buried Debris; Cap Soil; Intrinsic Remediation of Ground Water; Access Restrictions, and Land Use Restrictions (Alternative 2)**

##### **8.9.2.1 Soils (to include Buried Debris)**

Alternative 2 includes excavation and onsite thermal desorption of 330 CY of hot spot surface soil; 2,300 CY of soils associated with the former UST #2 exceeding soil PRGs; and 700 CY of offsite soils exceeding soil PRGs. The former tank farm area may be used as a staging and temporary stockpile area for the excavation of the soils located offsite and the excavated soils onsite. The thermal desorption includes mixing and soil handling to ensure optimal moisture content. There are no anticipated treatment residuals associated with thermal desorption as the bag house residuals will be worked back into soils and thermal processes. Scrubber water, if a scrubber is necessary, will be used as quench and evaporated. If residuals are generated and cannot be addressed as described, bag house waste will be characterized and disposed of offsite in either a solid or hazardous waste

landfill. Scrubber water will be either treated onsite and discharged, or transported offsite for disposal.

Treated soils will be used as backfill onsite in the former tank farm area and placed in the excavations. A regrading of the former tank farm area and installation of a soil cover will reduce storm water accumulation and infiltration and migration of soils off the site. The soil cover will constitute approximately 5,000 SY to include 6 inches of top soil and revegetation. Figure 8.9.2.1 depicts the components of alternative 2.

A compacted soil/clay cap of a 2.5-ft. thickness will be placed over 2,000 SY of the buried debris area. The cap includes 6 inches of topsoil and revegetation over the compacted clay layer. A 25-ft deep slurry wall will be installed around a 600-ft perimeter of the buried debris. The cap and slurry wall prevents direct exposure to the buried debris, storm water infiltration, and reduces the potential for LNAPL contamination within the buried debris to migrate to ground water.

#### **8.9.2.2 LNAPL**

Alternative 2 includes installation of a network of 16, 125-ft long 20-ft deep trenches and 16 extraction sumps for LNAPL extraction. Skimmers will be used in conjunction with extraction sumps to remove the LNAPL. The extraction system is estimated to be operational for a period of 3 years to remove the extractable LNAPL. The operational time has been estimated for pricing purposes. The remedy will be complete when the performance standards have been met. Extractable LNAPL is defined as measurable LNAPL greater than 0.02 ft in thickness. It is estimated that this process will remove approximately 75% of the estimated LNAPL quantity of 10,000 gallons. During installation of the extraction trenches, approximately 25 percent of the LNAPL will be directly removed. LNAPL floating on water in the open trenches during excavation will be removed with absorbent material. The trench system is estimated to remove approximately 50% of the LNAPL. The remaining LNAPL, approximately 25%, will be sorbed to subsurface soils and is not anticipated to migrate. The recovered LNAPL shall be sent to an offsite incinerator for treatment. Approximately 300 drums have been estimated to carry the LNAPL to an offsite incinerator. Approximately 700 CY of soils saturated with LNAPL (generated during trench installation), and absorbent materials shall be treated via thermal desorption onsite or disposed in a TSCA, hazardous or solid waste landfill. LNAPL extraction minimizes contaminant migration and reduces potential subsurface soil and ground water contamination.

#### **8.9.2.3 Ground Water**

Alternative 2 uses intrinsic remediation and attenuation as the

process to attain the ground water PRGs, as described in Section 8.4 above. If the favorable conditions that currently exist, in part, due to the presence of LNAPL, change as a result of the removal of LNAPL, enhancements will be added to the contaminated ground water (such as benzoic acid) to allow continuation of anaerobic degradation.

#### **8.9.2.4 Implementation and Cost**

Regrading and placement of the soil cover over the former tank farm area and the buried debris area will occur after the LNAPL system is installed within the period of one year.

The recoverable LNAPL is expected to be collected within 3 years based on the conceptual design developed in the FS.

Intrinsic remediation/attenuation is expected to be effective in meeting the ground water PRGs within 10 years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes cap and slurry wall maintenance. The 30-year present worth cost for Alternative 2 is \$5,200,000 and includes \$2,400,000 in capital costs and \$2,800,000 in O&M costs. The following costs are calculated equivalent to, but are not included in the 30-year PWC: (1) Arsenic treatment is estimated to cost \$3,600,000 and (2) Containment and treatment of organic contaminants are expected to cost \$3,400,000.

#### **8.9.2.5 Other Components**

Institutional controls including a fence, warning signs, and water use restrictions will be installed and implemented to eliminate exposure pathways. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person who performs the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation and thermal desorption of the soils onsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

Soils (to include buried debris), LNAPL and ground water monitoring will occur at least once each year for 30 years or

until the site contaminants meet the performance standards or indefinitely for containment components of the remedy. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met.

Five-year reviews would be conducted because waste would remain onsite.

### **8.9.3 Consolidate and Contain Soils that Exceed PRGs (Including Buried Debris); Remove/Treat 75% LNAPL; Intrinsic Remediation of Ground Water; and Access Restrictions, and Land Use Restrictions (Alternative 3)**

#### **8.9.3.1 Soils (to include Buried Debris)**

Alternative 3 includes excavation and offsite disposal in a TSCA or hazardous waste landfill of 200 CY of hot spot surface soils. TSCA (40 CFR 761.125) requirements for PCB spill cleanups require that soil contaminated by spills will be decontaminated to 10 ppm PCBs by weight provided that soil is excavated to a minimum depth of 10 inches. The excavated soil will be replaced with clean soil, i.e., containing less than one ppm PCBs, and the spill site will be restored (e.g., replacement of turf) (40 CFR 761.125 (c)(4)(v)). Approximately 7,700 CY of soils that exceed the soil PRGs, to include offsite soils, will be consolidated in the former tank farm area for containment with a cap and slurry wall. The TPH soils hot spot areas are included within the soils that exceed the soil PRGs. The cap includes a 2.5-ft thick compacted soil/clay cap, 6 inches of topsoil and revegetation more than a 10,000 SY area. The slurry wall is a 25-ft deep bentonite/soil subsurface barrier, designed to extend 5 ft below the water table and will be installed around the 1400-ft perimeter of the cap. Containment with a cap and slurry wall prevents direct exposure to site soils, reduces soils entrainment and migration offsite in surface water runoff, and minimizes the potential for contaminant migration in subsurface soils and ground water. Figure 8.9.3.1 depicts the components of alternative 3 with the exception of 200 CY which has been included in the cost estimate but is not depicted on the figure.

Alternative 3 has the same components with respect to the buried debris as alternative 2.

#### **8.9.3.2 LNAPL**

Alternative 3 has the same components with respect to the LNAPL as alternative 2.

#### **8.9.3.3 Ground Water**

Alternative 3 has the same components with respect to ground water remediation as alternative 2.

#### **8.9.3.4 Implementation and Cost**

Soil hot spot removal will be conducted prior to tank and concrete slab and wall removal, construction of LNAPL trenches, consolidation of soils that exceed the soil PRGs, and capping. The trenches will be impacted by neither cap construction, nor the cap impacted by the trenches, because the trenches will be completely backfilled and as structurally capable as natural subgrade material.

All other factor affecting implementation is the same as those described for alternative 2.

O&M includes cap and slurry wall maintenance. The 30-year present worth cost for Alternative 3 is \$5,700,000 and includes \$3,600,000 in capital costs and \$2,100,000 in O&M costs. The following costs are calculated equivalent to, but are not included in the 30-year PWC: Arsenic treatment is estimated to cost \$3,600,000, and containment and treatment of organic contaminants is expected to cost \$3,400,000.

#### **8.9.3.5 Other Components**

Institutional controls including a fence, warning signs, and water use restrictions will be installed and implemented during the implementation of the remedy to eliminate exposure. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person performing the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

The construction controls, reviews and monitoring programs are similar to alternative 2.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); the not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for

contaminated media may significantly alter the regulatory scheme at the time of cleanup. Consolidation and capping of the former UST #2 soils will comply with Utah UST regulatory requirements.

#### **8.9.4 Remove/Dispose of Soils that Exceed PRGs; Partial Removal/Containment of Buried-Debris; Remove/Treat 80% LNAPL; and Air Sparging/Vapor Extraction of Ground Water (Alternative 4)**

##### **8.9.4.1 Soils (to include Buried Debris)**

Alternative 4 includes excavation of 200 CY of soil hot spots areas; 21,000 CY of onsite soils that exceed the soil PRGs; 700 CY of offsite soils that exceed the soil PRGs, and disposal of the soil hot spot areas into a TSCA or hazardous waste landfill and the soils that exceed the soil PRGs (to include the TPH hot spot soils) into a solid waste landfill. Figure 8.9.4.1 depicts the components of alternative 4. A solid waste landfill was selected for the soils that exceed the soil PRGs because the material is not anticipated to be a characteristic hazardous waste from previous TCLP analyses (refer to section 6.0). Confirmation sampling will be conducted during RD/RA to confirm the appropriate disposal option. Removal and disposal of soils that exceed PRGs eliminate potential exposures to contaminants at the site and migration of contaminants to other media.

Alternative 4 includes partial excavation in the debris area to remove approximately 2,000 CY of debris and place a cap over the remainder of the debris area. The LNAPL is expected to be mixed with the debris and located above the buried concrete slab. The 2,000 CY of excavated debris is expected to contain 600 CY of saturated LNAPL debris and 1,400 CY of soil. The volume of partial excavation was derived by estimating the amount of soil and debris above the buried concrete slab. The LNAPL saturated debris will be disposed in a TSCA landfill due to the potential for the presence of PCBs and it is anticipated that the soils will be disposed in a solid waste landfill. The soil will be sampled during excavation, to determine if a solid waste landfill is appropriate or whether TSCA or hazardous waste landfill disposal is appropriate. A compacted soil/clay cap of a 2.5-ft thickness will be placed over 2,000 SY of the buried debris area. The cap includes 6 inches of topsoil and revegetation over the compacted clay layer. The removal of the LNAPL-saturated debris will reduce contaminant migration to ground water and subsurface soils. The cap prevents direct exposure to the buried debris area.

##### **8.9.4.2 LNAPL**

Alternative 4 includes installation of a network of 7, 125-ft long and 9, 85-ft long 20-ft deep trenches and 16 extraction sumps for LNAPL extraction. Skimmers will be used in conjunction with extraction sumps to remove the LNAPL. In addition to the

trenches, it is anticipated that the soil excavations will yield water and LNAPL mixtures. Additional LNAPL will be recovered using absorbent materials in the open soil excavations. The extraction system will be operated for 3 years to remove the extractable LNAPL. Extractable LNAPL is defined as measurable LNAPL greater than 0.02 ft in thickness. It is estimated that this process will remove approximately 80% of the estimated LNAPL quantity of 10,000 gallons. During installation of the extraction trenches and excavation of the soils, approximately 40 percent of the LNAPL will be directly removed. LNAPL floating on water in the open trenches during excavation will be removed with absorbent material. The trench extraction system is estimated to removed approximately 40% of the LNAPL. The remaining LNAPL, approximately 20%, will be sorbed to subsurface soils and is not anticipated to migrate. The recovered LNAPL shall be sent to an offsite incinerator for treatment. Approximately 300 drums have been estimated to carry the LNAPL to an offsite incinerator. Approximately 600 CY of soils saturated with LNAPL (generated during trench installation) and 400 CY of direct excavation of LNAPL during soil excavation, and about twice the amount of absorbent materials as alternatives 2 and 3 shall be treated via thermal desorption onsite or disposed in a TSCA or hazardous waste landfill. LNAPL extraction minimizes contaminant migration and reduces potential subsurface soil and ground water contamination.

#### **8.9.4.3 Ground Water**

Alternative 4 includes the installation of a network of approximately 40 sparging wells, completed below the water table, to inject air into the dissolved plume area to strip the chemicals from the water. Four (4) vapor extraction wells will be installed to recover the injected air and vapors. The system will be constructed as four separate modules, each with a compressor to deliver air to 10 wells and a blower to provide a vacuum to one extraction well. The sparging wells will consist of 2-inch PVC installed to a depth of 60 ft, and will deliver approximately 15 cubic ft per minute (cfm) to the saturated zone. The compressor for each module is rated at 150 cfm (10 wells at 15 cfm each). Each extraction well will be completed of stainless steel to a depth of 15 ft, and will be designed to extract the air introduced by the sparging wells using a blower rated at 300 cfm.

The cuttings generated during the drilling of the sparging and, extraction wells will be disposed of offsite in a solid waste landfill confirmation sampling will determine if hazardous waste disposal is required. If the system performs as anticipated, the sparging will reduce the toxicity, mobility and volume of the constituents by removing them from the ground water and preventing potential exposure. It is anticipated that amounts below the State of Utah de minimis amount or health-based



exposure limits of vapor emissions will be released into the atmosphere, based upon preliminary design of the system during the FS. These limits will be revisited, and verified during the remedial design of the system.

The location of the four modules that make up the air sparging/vapor extraction system will be determined during RD/RA, but will be located to address the plume area shown in Figure 8.9.4.1.

#### **8.9.4.4 Implementation and Cost**

The excavation and appropriate offsite disposal of the soil hot spots (200 CY), soils onsite that exceed soil PRGs (21,000 CY), and soils offsite that exceed soil PRGs (700 CY) will be completed in less than six months. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Soil excavation onsite will be conducted after the removal of the tanks, liner, concrete slab and wall, and prior to the construction of LNAPL trenches, and capping of buried debris area. The trenches will be impacted by neither cap construction, nor the cap impacted by the trenches, because the trenches will be completely backfilled and as structurally capable as natural subgrade material.

Regrading and placement of the soil cover over the buried debris area will occur after the LNAPL system is installed within the period of one year.

LNAPL extraction system installation will be conducted after hot spot removal and excavation of soils that exceed the soil PRGs. The recoverable LNAPL is expected to be collected within 3 years based on the conceptual design developed in the FS.

Air sparging/vapor extraction is expected to be effective in meeting the ground water PRGs within seven years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes 3 years operating and maintenance costs for the LNAPL extraction system and seven years operation of the ground water air sparging/vapor extraction system. The 30-year present worth cost for Alternative 4 is \$10,900,000 and includes \$7,200,000 in capital costs and \$3,700,000 in O&M costs. The following costs are calculated equivalent to, but are not included in the 30-year PWC: arsenic treatment is estimated to cost \$3,600,000. The contingency for organics was not estimated for this alternative because air sparging is expected to control the ground water plume.

#### **8.9.4.5 Other Components**

Institutional controls including a fence, and warning signs will be used during the remedy, however, no institutional controls will be necessary after the remedy is complete.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

No long-term monitoring is required for the soils. LNAPL and ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards or indefinitely if the remedy has a containment component. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARS identified in Table 8.4 would be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the regulatory scheme at the time of cleanup. Excavation and landfilling of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements.

Because the air sparging/vapor extraction system is expected to remediate the ground water in seven years, the waste is considered left on the site for that period of time and thus the site is subject to five-year reviews.

#### **8.9.5 Remove/Thermal Treatment of Soils that Exceed PRGs; Partial Removal/Containment of Buried Debris; Remove/Treat 80% LNAPL; Intrinsic Remediation at Ground Water; and Access Restrictions, and Land Use Restrictions (Alternative 5)**

##### **8.9.5.1 Soils (to include Buried Debris)**

Alternative 5 includes excavation of 200 CY of soil hot spots areas; 21,000 CY of onsite soils that exceed the soil PRGs

(includes 130 CY of TPH hot spot soils); 700 CY of offsite soils that exceed the soil PRGs, and thermal desorption onsite using a mobile thermal desorption unit. Figure 8.9.5.1 depicts the components of alternative 5. The thermal desorption includes mixing and soil handling to ensure optimal moisture content. There are no anticipated treatment residuals associated with thermal desorption as the bag house residuals will be worked back into soils and thermal processes. Scrubber water, if a scrubber is necessary, will be used as quench and evaporated. If residuals are generated and cannot be addressed as described, bag house waste will be characterized and disposed of offsite in either a solid or hazardous waste landfill. Scrubber water will be either treated onsite and discharged or transported offsite for disposal. Treatment of soil hot spots areas and soils on- and offsite that exceed the soil PRGs, eliminates potential exposures to contaminants at the site and migration of contaminants to other media.

Alternative 5 includes partial excavation in the debris area to remove approximately 2,000 CY of LNAPL and placement of a cap over the remainder of the debris area. The LNAPL is expected to be mixed with the debris and located above the buried concrete slab. The 2,000 CY of excavated debris is expected to consist of approximately 600 CY of saturated LNAPL debris and 1,400 CY of soil. The volume of partial excavation was derived by estimating the amount of soil and debris above the buried concrete slab, as shown in Figures 6.1.1.3.A and B. The LNAPL saturated debris will be disposed in a TSCA landfill due to potential for PCBs and it is anticipated that the soils will be treated by direct, thermal desorption in the onsite mobile unit. A compacted soil/clay cap of a 2.5-ft thickness will be placed over 2,000 SY of the buried debris area. The cap includes 6 inches of topsoil and revegetation over the compacted clay layer. The removal of the LNAPL-saturated debris will reduce contaminant migration to ground water and subsurface soils. The cap prevents direct exposure to the buried debris area.

#### **8.9.5.2 LNAPL**

Alternative 5 is the same as Alternative 4, with one exception. The overburden of LNAPL saturated soils will be disposed in a TSCA or hazardous waste landfill and not treated in the onsite mobile thermal desorption unit.

#### **8.9.5.3 Ground Water**

Alternative 5 has the same components with respect to ground water remediation as alternatives 2 and 3.

#### **8.9.5.4 Implementation and Cost**

The excavation and thermal desorption of the soil hot spots (200

CY), soils onsite that exceed soil PRGs.(21,000 CY), and soils offsite that exceed soil PRGs (700 CY) will be conducted concurrently with LNAPL extraction and is anticipated to be complete within one year. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Soil excavation will be conducted after the removal of the liner, tanks, concrete slab and wall, and before the construction of LNAPL trenches, and capping of buried debris area. The trenches will be impacted by neither cap construction, nor the cap impacted by the trenches, because the trenches will be completely backfilled and as structurally capable as natural subgrade material.

Regrading and placement of the soil cover over the buried debris area will occur after the LNAPL system is installed within the period of one year.

LNAPL extraction will be conducted concurrently with soils and excavation and thermal treatment. The recoverable LNAPL is expected to be collected within 3 years based on the conceptual design developed in the FS.

Intrinsic remediation/attenuation is expected to be effective in meeting the ground water PRGs within 10 years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes maintenance of the buried debris cap and 3 years of operating the LNAPL extraction system. The 30-year present worth cost for Alternative 5 is \$9,800,000 and includes \$3,600,000 in capital costs and \$6,200,000 in O&M costs. The following costs are calculated equivalent to, but are not included in the 30-year PWC: arsenic treatment is estimated to cost \$3,600,000 and containment and treatment of organic contaminants is expected to cost \$3,400,000.

#### **8.9.5.5 Other Components**

Institutional controls including a fence, warning signs, and water use restrictions will be installed and implemented during the remediation to eliminate exposure. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person performing the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite and during thermal desorption onsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

No long-term monitoring is required for the soils. LNAPL and ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards or indefinitely if the remedy has a containment component. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. Air emission standards and ARARs regarding thermal desorption will be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the regulatory scheme at the time of cleanup. Excavation and thermal desorption of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements.

Waste is considered left on the site. Thus, the site is subject to five-year reviews.

#### **8.9.6 Remove/Thermal Treatment of Soils that Exceed PRGs; Remove/Treat 100% LANPL; Remove/Treat/Dispose Buried Debris; Intrinsic Remediation of Ground Water; and Access and Land Use Restrictions (Alternative 6)**

##### **8.9.6.1 Soils (to include Buried Debris)**

With respect to the soils, alternative 6 is the same as alternative 5. Figure 8.9.6.1 depicts the components of alternative 6.

Alternative 6 includes excavation of approximately 14,000 CY of the buried debris, disposal of the debris in a TSCA or hazardous waste landfill and onsite thermal desorption of the soils. Approximately one third or 4,000 CY of the excavated material is anticipated to be debris and the remaining 10,000 CY is anticipated to be soil. Excavation of the debris area, TSCA or

hazardous waste disposal and thermal desorption of the debris and soils will reduce the mobility, toxicity and volume of contaminants.

#### **8.9.6.2 LNAPL**

Alternative 6 includes direct excavation of approximately 3,000 CY of LNAPL saturated soils, removal of LNAPL from water in open excavations with absorbent material and skimmers, and offsite incineration of the LNAPL. The basis of design is to remove, through direct excavation, the soils saturated with LNAPL and associated overburden of approximately 17,000 CY which is present in the area where the LNAPL thickness is greater than 0.02 ft. The overburden soils will be used as backfill. It is anticipated that no water will be pumped from the excavation, but rather the design is focussed to remove only LNAPL via skimming and the use of absorbent materials. The 3,000 CY of saturated soils and absorbent materials will be thermally desorbed onsite. The volume of absorbent materials to be used for capturing the LNAPL is expected to be 5 times the amount in alternatives 2 and 3 and 2 1/2 times the amount in alternatives 4 and 5. It is the goal of this design to capture and/or recover 100 percent of the LNAPL, however, it should be noted that when the thickness of the LNAPL is less than 0.02 ft or the ability to perform direct excavation cannot be done without demolition to the existing infrastructure or buildings then recovery will not occur. The recovered LNAPL shall be sent to an offsite incinerator for treatment. Approximately 300 drums have been estimated to carry the LNAPL to an offsite incinerator. LNAPL removal minimizes contaminant migration and reduces potential subsurface soil and ground water contamination.

#### **8.9.6.3 Ground Water**

Alternative 6 has the same components with respect to ground water remediation as alternatives 2, 3 and 5.

#### **8.9.6.4 Implementation and Cost**

The excavation and thermal desorption of the soil hot spots (200 CY), soils onsite that exceed soil PRGs (21,000 CY), and soils offsite that exceed soil PRGs (700 CY) will be conducted concurrently with LNAPL excavation and is anticipated to be completed within one year and possibly within six months. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Prior to excavation of soils, the liner, concrete wall and slab, and two tanks will be removed and disposed at a TSCA or hazardous waste facility. Approximately 600 CY of soils excavated during the tank removal will be thermally treated onsite.

Direct excavation of LNAPL is anticipated to remove as much of the LNAPL as feasible within one year.

Intrinsic remediation/attenuation is expected to be effective in meeting the ground water PRGs within 10 years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes the operation of the onsite thermal desorption unit for a period of one year and monitoring. The 30-year present worth cost for Alternative 6 is \$14,200,000 and includes \$6,900,000 in capital costs and \$7,300,000 in O&M costs. The following costs are calculated equivalent to, but are not included in the 30-year PWC: arsenic treatment is estimated to cost \$3,600,000, and containment and treatment of organic contaminants is expected to cost \$3,400,000.

#### **8.9.6.5 Other Components**

Institutional controls including a fence, warning signs, and access restrictions will be installed and administered during the implementation of the soils (to include buried debris) and LNAPL remedy. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person who performs the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

The excavation of the buried debris area will be performed using a vapor enclosure to control potential dust, organic vapor, or odor emissions.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite and during thermal desorption onsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

No long-term monitoring is required for the soils or LNAPL. Ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and

selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. Air emission standards and ARARs regarding thermal desorption will be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the regulatory scheme at the time of cleanup. Excavation and thermal desorption of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements.

Because waste is left on the site, the site is subject to five-year reviews.

**8.9.7 Remove/Thermal Treatment of Soils that Exceed PRGs; Remove/Treat 100% LNAPL; Remove/Treat/Dispose Buried Debris; Treat Ground Water in POTW; and Access and Land Use Restrictions (Alternative 7)**

**8.9.7.1 Soils (to include Buried Debris)**

With respect to the soils, alternative 7 is the same as alternatives 5 and 6. Figure 8.9.7.1 depicts the components of alternative 7 and 8.

With respect to buried debris, alternative 7 has the same components as alternative 6.

**8.9.7.2 LNAPL**

Alternative 7 has the same components as alternative 6.

**8.9.7.3 Ground Water**

Alternative 7 includes extraction of ground water at 40 to 100 gallons per minute (gpm) to ensure contaminant plume containment, and water treatment, if necessary, will be performed with UV oxidation. Disposal of the water will be via discharge to the POTW. It is anticipated that POTW treatment standard will be similar to those already in place at the site; if so, onsite treatment of the water will not be necessary to meet those standards. An onsite treatment system (UV oxidation) is included to allow for onsite treatment. An EPA batch flushing modeling approach, discussed in EPA guidance on remedial actions for contaminant sizes (EPA, 1988), was used to estimate the number of pore volumes that must be removed for remediation. Calculations are available within the FS that show that 40 to 100 gpm will capture the plume, however, the final pumping rate will



be determined as part of RD. It is also currently anticipated that one ground water extraction well installed in the former tank farm area will control the impacted plume area, however, the actual number of wells(s) and location of the wells will be determined during RD. The generated water, approximately 3,000,000 to 4,000,000 gallons per month, can be accepted by the local POTW (Salt Lake City Water Reclamation Plant), according to the Pretreatment Administrator and the Plant Manager. Discharge to and treatment by the POTW, if it performs as anticipated, will reduce the mobility, toxicity and volume of contamination.

#### **8.9.7.4 Implementation and Cost**

The excavation and thermal desorption of the soil hot spots (200 CY), soils onsite that exceed soil PRGs (21,000 CY), and soils offsite that exceed soil PRGs (700 CY) will be conducted concurrently with LNAPL excavation and is anticipated to be completed within one year and possibly within six months. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Prior to excavation of soils, the liner, concrete wall and slab, and two tanks will be removed and disposed at a TSCA or hazardous waste facility. Approximately 600 CY of soils excavated during the tank removal will be thermally treated onsite.

Direct excavation of LNAPL is anticipated to remove as much of the LNAPL as feasible within one year.

Ground water extraction and POTW discharge is expected to be effective in meeting the ground water PRGs within six years. However, the ground water treatment model that was used to derive the number of years may be overly aggressive due to the assumptions made within the model so the performance period has been extended to 20 years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes the operation of the onsite thermal desorption unit for a period of one year; discharge costs to POTW, compliance monitoring, and extraction pumping for 20 years; and monitoring. The O&M costs for the onsite UV oxidation treatment are not included because they will not be required because the current concentration of the contaminants is acceptable to the local POTW. If UV oxidation treatment is needed, it will double the cost of treatment. The 30-year present worth cost for Alternative 7 is \$16,600,000 and includes \$6,800,000 in capital costs and \$9,800,000 in O&M costs. Alternative 7 does include a contingency measure for arsenic treatment, if concentrations exceed either the ground water PRGs or the treatment capacity of the POTW. The 30-year PWC for the arsenic contingency is

\$900,000 because the ground water remedy already includes the well installation, groundwater extraction, and treatment.

#### **8.9.7.5 Other Components**

Institutional controls including a fence, warning signs, and access restrictions will be installed and administered during the implementation of the soils (to include buried debris) and LNAPL remedy. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person performing the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

The excavation of the buried debris area will be performed using a vapor enclosure to control potential dust, organic vapor, or odor emissions.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite and during thermal desorption onsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

No long-term monitoring is required for the soils or LNAPL. Ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. Air emission standards and ARARs regarding thermal desorption will be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alternate regulatory scheme at the time of cleanup. Excavation and thermal desorption of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements.

Waste is considered left on the site and thus the site is subject to five-year reviews.

**8.9.8 Remove/Thermal Treatment of Soils that Exceed PRGs; Remove/Treat 100% LNAPL; Remove/Treat/Dispose Buried Debris; Treat Ground Water on Site via Ultraviolet Oxidation; and Access and Land Use Restrictions (Alternative 8)**

**8.9.8.1 Soils (to include Buried Debris)**

With respect to the soils, alternative 8 is the same as alternatives 5, 6 and 7. Figure 8.9.7.1 depicts the components of alternative 8.

With respect to buried debris, alternative 8 has the same components as alternatives 6 and 7.

**8.9.8.2 LNAPL**

Alternative 8 has the same components as alternatives 6 and 7.

**8.9.8.3 Ground Water**

Alternative 8 includes similar components as described in alternative 7 with an increased extraction of ground water at 500 gpm to ensure contaminant plume containment, and water treatment, if necessary, with UV oxidation. The treated water will be reinjected into the aquifer. An onsite treatment system (UV oxidation) is included to allow for onsite treatment. An EPA batch flushing modeling approach, discussed in EPA guidance on remedial actions for contaminated sites (EPA, 1988), was used to estimate the number of pore volumes that must be removed for remediation. Calculations are available within the FS that show that 500 gpm will capture the plume, however, the final pumping rate will be determined as part of RD. It is also currently anticipated that two ground water extraction wells will be installed, at a total extraction rate of 500 gpm, however, the actual number of wells and location of the wells will be determined during RD. The generated water, approximately 22,000,000 gallons per month, will be reinjected, after treatment to meet the ground water PRGs, into the aquifer via four injection wells. The treatment system includes chemical treatment for removal of organics. Inorganic treatment components, with special emphasis on arsenic, will be added if the inorganic concentrations exceed the ground water PRGs. Treatment and reinjection, if it performs as anticipated, will reduce the mobility, toxicity and volume of contamination.

**8.9.8.4 Implementation and Cost**

The excavation and thermal desorption of the soil hot spots (200 CY), soils onsite that exceed soil PRGs (21,000 CY), and soils

offsite that exceed soil PRGs (700 CY) will be conducted concurrently with LNAPL excavation and is anticipated to be completed within one year and possibly within 6 months. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Prior to excavation of soils, the liner, concrete wall and slab, and two tanks will be removed and disposed at a TSCA or hazardous waste facility. Approximately 600 CY of soils excavated during the tank removal will be thermally treated onsite.

Direct excavation of LNAPL is anticipated to remove as much of the LNAPL as feasible within one year.

Ground water extraction, treatment and reinjection are expected to be effective in meeting the ground water PRGs within 6 years. However, the ground water treatment model that was used to derive the number of years may be overly aggressive due to the assumptions made within the model so the performance period has been extended to 20 years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes the operation of the onsite thermal desorption unit for a period of one year; operation of treatment facilities and reinjection; compliance monitoring, and extraction pumping for 20 years; and monitoring. The 30-year present worth cost for Alternative 8 is \$24,400,000 and includes \$7,200,000 in capital costs and \$17,200,000 in O&M costs. Alternative 8 does include a contingency measure for arsenic treatment, if concentrations exceed either the ground water PRGs or the treatment capacity of the POTW. The 30-year PWC for the arsenic contingency is \$900,000 because the ground water remedy already includes the well installation, groundwater extraction, and treatment.

#### **8.9.8.5 Other Components**

Institutional controls including a fence, warning signs, and access restrictions will be installed and administered during the implementation of the soils (to include buried debris) and LNAPL remedy. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person performing the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department Natural Resources.

The excavation of the buried debris area will be performed using a vapor enclosure to control potential dust, organic vapor, or

odor emissions.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite and during thermal desorption onsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

No long-term monitoring is required for the soils or LNAPL. Ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. Air emission standards and ARARs regarding thermal desorption will be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the regulatory scheme at the time of cleanup. Excavation and thermal desorption of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements.

Waste is considered left on the site. Thus, the site is subject to five-year reviews.

#### **8.9.9 Remove/Dispose Hot Spot Soils; Landfarm Soils that Exceed PRGs; Remove/Dispose Buried Debris; Remove/Dispose 100% LNAPL; Intrinsic Remediation of Ground Water; and Access and Land Use Restrictions (Alternative 9)**

##### **8.9.9.1 Soils (to include Buried Debris)**

Alternative 9 includes excavation of 440 CY of soil hot spot areas (to include soils that exceeds 50,000 mg/kg TPH); and excavation and direct biological treatment (land farming) of approximately 21,000 CY of soils onsite and 700 CY offsite that exceed soil PRGs. Approximately 200 CY of soil exceeding soil hot spot criterion is anticipated to contain PCBs and will be disposed in a TSCA landfill. Approximately 240 CY of soils exceeding TPH of 50,000 mg/kg will be disposed in a solid waste landfill. Upon completion of biological treatment of

approximately 21,700 CY, the soil will be backfilled on the site and revegetated. Figure 8.7.9.1 shows the components of alternative 9. The biological treatment (land farming) requires demolition of all of the site buildings on the eastern portion of the property.

As part of the remedial design, a study to determine the degradation potential of the contaminants will be performed. This study will evaluate appropriate nutrient levels and soil moisture content, determine the presence of inhibitory contaminants such as high metal concentrations, and determine, optimum land farming operating guidelines. To enhance the biodegradation of hydrocarbons, organic material ("bulking agents") may be added to the soils. A bulking factor of 30 percent has been assumed for costing purposes. An odor study will also be conducted to evaluate potential odor emissions. If odors are of concern, land farming will be conducted in enclosures where odor emissions can be controlled and treated. Costs associated with enclosing land farming operations within a structure have not been included as odors are not expected to warrant enclosure.

Prior to construction of the land farm all of the structures will be removed from the eastern portion of the site. The land farm will cover approximately a two-acre area and include a flat impoundment lined with a synthetic liner. Soil will be excavated and stored in a stockpile, delivered from the pile area and dumped by positioning each load in front of the previous load to form a continuous row of soil. The row will be graded and large rocks will be removed. The windrows will be established by advancing earthwork equipment used for aeration through approximately one third of the cross-section of the soil layer. Approximately 10,000 CY of material or one lift will be treated every 2 years. Aeration will be achieved by mechanical methods using earthwork equipment. The windrows will be periodically turned and "fluffed" using this equipment. Nutrient levels will be monitored and adjusted as needed by incorporating controlled-released fertilizers when the rows are turned. Water will be added by spraying the rows. The pH may be adjusted by incorporating lime. Soil samples will be collected at the beginning of the operation and periodically during land farming activities to monitor the degradation progress (24 samples have been used for costing purposes, the actual number of samples will be determined during RD). Initial operation of the land farm may require addition of a microbial inoculum. After, one lift of soil is treated, another lift of soil will be removed from the stockpile and land farmed. The treated soil will be backfilled on the site and the area revegetated.

Alternative 9 includes excavation of approximately 14,000 CY of the buried debris, disposal of the debris in a TSCA or hazardous waste landfill and disposal of the soils that exceed soil PRGs

into either a TSCA, hazardous or solid waste landfill. Approximately one third or 4,000 CY of the excavated material is anticipated to be debris and the remaining 10,000 CY is anticipated to be soil. Excavation of the debris area, TSCA or hazardous waste disposal and solid waste landfill disposal of the soils that exceed soil PRGs (to include soils that exceeds 50,000 mg/kg TPH) will reduce the mobility, toxicity and volume of contaminants.

#### **8.9.9.2 LNAPL**

Alternative 9 has the same components with respect to LNAPL removal as alternatives 6, 7 and 8 with the exception that alternative 9 disposes the 3,000 CY of LNAPL-saturated soils at an offsite permitted TSCA or solid waste landfill.

#### **8.9.9.3 Ground Water**

Alternative 9 has the same components with respect to ground water remediation as alternatives 2, 3, 5 and 6.

#### **8.9.9.4 Implementation and Cost**

The excavation and disposal of the soil hot spots (440 CY), and biological treatment of soils onsite that exceed soil PRGs (21,000 CY), and soils offsite that exceed soil PRGs (700 CY) will be conducted concurrently with LNAPL excavation. The excavation of the soil hot spots (440 CY) will occur within 6 months. The land farming is anticipated to be completed within 6 years assuming 2 years per lift of soil. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Prior to excavation of soils, the liner, concrete wall and slab, and two tanks will be removed and disposed at a TSCA or hazardous waste facility. Approximately 600 CY of soils excavated during the tank removal will be disposed either in a TSCA, hazardous or solid waste landfill.

Direct excavation of LNAPL is anticipated to remove as much of the LNAPL as feasible within one year.

Intrinsic remediation/attenuation is expected to be effective in meeting the ground water PRGs within 10 years.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes the operation of the onsite land farm for a period of 6 years and dust/odor/air monitoring. The 30-year present worth cost for Alternative 9 is \$18,000,000 and includes \$11,000,000 in capital costs and \$7,000,000 in O&M costs. The

following costs are calculated equivalent to, but are not included in the 30-year PWC: arsenic treatment is estimated to cost \$3,600,000, and containment and treatment of organic contaminants is expected to cost \$3,400,000.

#### **8.9.9.5 Other Components**

Institutional controls including a fence, warning signs, and access restrictions will be installed and administered during the implementation of the soils (to include buried debris) and LNAPL remedies. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person performing the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

The excavation of the buried debris area will be performed using a vapor enclosure to control potential dust, organic vapor, or odor emissions.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite and during biological treatment of the soils onsite to and during compliance with air quality requirements. The biological treatment of the soils may be conducted in an enclosure. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

No long-term monitoring is required for the soils or LNAPL. Ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed using remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. Air emission standard and ARARs regarding thermal desorption will be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the



regulatory scheme at the time of cleanup. Excavation and thermal desorption of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements.

Waste is considered left on the site. Thus, the site is subject to five-year reviews.

**8.9.10 Remove/Dispose Hot Spot Soils; Consolidate/Cap Soils that Exceed PRGs; Partial Removal/Disposal of Soil and Buried Debris and Cap Remaining Debris; Remove/Treat 100% LNAPL; Intrinsic Remediation of Ground Water; and Access and Land Use Restrictions (Alternative 10)**

**8.9.10.1 Soils (to include Buried Debris)**

Alternative 10 includes excavation of 330 CY of soil hot spot areas (includes soils exceeding 100,000 mg/kg TPH) for offsite disposal in the appropriate permitted off site landfill(s). Alternative 10 also includes excavation of 7,300 CY of soil onsite and 700 CY of soils offsite that exceed soil PRGs; and consolidation of the excavated soil with approximately 13,700 CY of contaminated soils in the former tank farm area under a soil or asphalt cap. Approximately 200 CY of soil exceeding soil hot spot criterion is anticipated to contain PCBs and will be disposed in an offsite permitted TSCA landfill. Approximately 130 CY of soils exceeding TPH of 100,000 mg/kg (but not containing PCBs) will be disposed of offsite in a permitted solid waste landfill. Because a majority of the soils that exceed the soil PRGs are located in the former tank farm area, this area was chosen for consolidation. The areas to be excavated (and consolidated on-site) include approximately 5,000 CY of soils on the east and south part of the site and backfill with clean soil; 2,300 CY of soils from the former UST #2 area and backfill with clean soil; and 700 CY of offsite soils and regrade. Prior to soil consolidation, the two large warehouse buildings will be demolished and disposed of in a solid waste landfill. The cover includes either a 42-inch layer of clean soil or a 6-inch asphalt cap. Soil depth of 42 inches is based on a frost depth of 30 inches, with sufficient extra depth to accommodate a spread footing for a slab on grade building, and a utility installation depth of 12 inches below the frost line based on City of Salt Lake building permit guidelines. The cover will be placed over a 10,000 SY area (8,000 SY over the former tank farm and warehouse area and 2,000 SY over the debris area). Figure 8.9.10.1 shows the components of alternative 10.

Alternative 10 is similar to alternative 4 which includes partial excavation in the debris area to remove approximately 2,000 CY of buried debris and placement of a cap over the remaining debris. The LNAPL is expected to be mixed with the debris and located above the buried concrete slab. The 2,000 CY of excavated debris is expected to contain 600 CY of saturated LNAPL debris and 1,400

CY of soil. The volume of partial excavation was derived by estimating the amount of soil and debris above the buried concrete slab. However, alternative 10 includes demolition and removal of the slab and further investigation of the debris area to ensure that all LNAPL-saturated soil and debris is excavated. The LNAPL saturated debris will be disposed in an offsite permitted TSCA landfill due to potential for PCBs and it is anticipated that the soils will be disposed in an offsite permitted solid waste landfill. The soil will be sampled during excavation, to determine if a solid waste landfill is appropriate or whether TSCA or hazardous waste (RCRA Subtitle C) disposal is appropriate. For costing purposes, it has been assumed that 2,000 CY of buried debris would be disposed in a TSCA landfill. Disposal cost of additional contamination under the slab, if any, has not been included or estimated as part of the cost estimate. After excavation, the 2,000 SY area will be regraded and covered with either a 42-inch layer of clean soil or a 6-inch asphalt cap.

#### **8.9.10.2 LNAPL**

Alternative 10 has the same components as alternatives 6, 7, 8 and 9, with the exception that alternative 10 identified a volume of 19,000 CY of overburden and the 3,000 CY of saturated LNAPL soils will be sent offsite for appropriate disposal (i.e., TSCA, hazardous or solid waste permitted facility).

#### **8.9.10.3 Ground Water**

Alternative 10 has the same components with respect to ground water remediation as alternatives 2, 3, 5, 6 and 9.

#### **8.9.10.4 Implementation and Cost**

The excavation and disposal of the soil hot spots (330 CY), and excavation and consolidation of soils onsite that exceed soil PRGs (21,000 CY), and soils offsite that exceed soil PRGs (700 CY) will be conducted concurrently with LNAPL excavation. The excavation of the soil hot spots (330 CY) will occur within 6 months. The excavation of the buried debris will occur simultaneously with the excavation of the other soils.

Prior to excavation of soils, the linear, concrete wall and slab, and two tanks will be removed and disposed at a TSCA, hazardous or solid waste facility. Approximately 600 CY of soils excavated during the tank removal will be disposed either in a TSCA, hazardous or solid waste landfill. The two large warehouse buildings will be demolished and disposed in a solid waste landfill.

The overburden above the LNAPL plume will be removed to facilitate LNAPL excavation and skimming. Once the LNAPL and

LNAPL-saturated soil have been removed, the overburden will be backfilled and the remaining soils that exceed the soil PRGs will be consolidated in the former tank farm area for containment under clean soil or an asphalt cap. Direct excavation of LNAPL is anticipated to remove as much of the LNAPL as feasible within one year. Excavation and consolidation of the soils that exceed soil PRGs is expected to be completed within one year.

Intrinsic remediation/attenuation is expected to be effective in meeting the ground water PRGs within 10 years. However, if ongoing monitoring shows that the intrinsic bioremediation is not occurring or quantification of biodegradation of vinyl chloride cannot be adequately performed, then the selection of intrinsic remediation as a remediation of the contaminated ground water for the Petrochem/Ekotech site will be reevaluated by EPA and modifications or initiation of contingency measures may be deemed necessary by EPA to be protective of human health and the environment.

Material, equipment, and specialists are readily available to implement this remedy.

O&M includes monitoring. The 30-year present worth cost for Alternative 10 is \$6,100,000 and includes \$4,900,000 in capital costs and \$1,200,000 in O&M costs. The following costs are calculated equivalent to, but are not included in the 30-year PWC: arsenic treatment is estimated to cost \$3,600,000, and containment and treatment of organic contaminants is expected to cost \$3,400,000.

#### **8.9.10.5 Other Components**

Institutional controls including a fence, warning signs, and access restrictions will be installed and administered during the implementation of the soils (to include buried debris) and LNAPL remedies and after the remedies to ensure containment of the soils. Water use restrictions will include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plume, except for remedial purposes. The person performing the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

During excavation activities, dust and odors will be controlled with foam. Air monitoring will be conducted during the soils excavation onsite and offsite to ensure compliance with air quality requirements. Workers at the site will be required to wear personal protective equipment to protect them from potential contaminant exposure.

Long-term monitoring is required for the soils. Ground water long-term monitoring will occur at least once each year for 30 years or until the site contaminants meet the performance standards. The actual number of samples, location of sampling, sampling techniques, contaminants to be analyzed, analytical methods, and frequency of samples, etc. will be determined under a Compliance Monitoring Program that will be developed during remedial design. An estimated cost for monitoring has been estimated for purposes of comparing and selecting an alternative for cleanup.

The chemical-, location-, and action-specific ARARs identified in Table 8.4 would be met. Air emission standards and ARARs regarding thermal desorption will be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the regulatory scheme at the time of cleanup. Containment of soils must meet applicable or relevant and appropriate requirements for cover and cover maintenance.

Because waste is considered left on the site, the site is subject to five-year reviews.

**Section 9.0**  
**Summary of the Comparative Analysis of Alternatives**

## Section 9.0

### Summary of the Comparative Analysis of Alternatives

In this section, alternatives developed for the Site are evaluated and compared to each other using the nine evaluation criteria required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 CFR § 300.430) to identify the alternative that provides the best balance among the criteria. The comparative analysis provides the basis for determining which alternative presents the best balance between the EPA's nine evaluation criteria listed below. The first two cleanup evaluation criteria are considered *threshold criteria* that must be met by the selected remedial action. The five *primary balancing criteria* are balanced to achieve the best overall solution. The final two *modifying criteria* that are considered in remedy selection are State acceptance and community acceptance.

#### ! Threshold Criteria

1. **Overall Protection of Human Health and the Environment** assesses the protection afforded by each alternative, considering the magnitude of the residual risk remaining at the site after the response objectives have been met. Protectiveness is determined by evaluating how site risks from each exposure route are eliminated, reduced, or controlled by the specific alternative. The evaluation also takes into account short-term or cross-media impacts that result from implementation of the alternative remedial activity.
2. **Compliance with Applicable or Relevant and Appropriate Requirements** addresses whether a remedy will meet all Federal and State environmental laws and/or provides grounds for a waiver. Section 121(d) of the Superfund Amendments and Reauthorization Act (SARA) mandates that for all remedial actions conducted under CERCLA, cleanup activities must be conducted in a manner that complies with ARARs. The NCP and SARA have defined both applicable requirements and relevant and appropriate requirements as follows:
  - Applicable requirements are those federal and state requirements that would be legally applicable, either directly, or as incorporated by a federally authorized state program.
  - Relevant and appropriate requirements are those federal

and state requirements that, while not legally "applicable," are designed to apply to problem sufficiently similar to those encountered at CERCLA sites that their application is appropriate. Requirements may be relevant and appropriate if they would otherwise be "applicable," except for jurisdictional restrictions associated with the requirement.

- Other requirements to be considered are federal and state nonregulatory requirements, such as guidance documents or criteria. Advisories or guidance documents do not have the status of potential ARARs. However, where there are no specific ARARs for a chemical or situation, or where such ARARs are not sufficient to be protective, guidance or advisories should be identified and used to ensure that a remedy is protective.

- **Primary Balancing Criteria**

3. **Long-Term Effectiveness and Permanence** refer to the ability of a remedy to provide reliable protection of human health and the environment over time. The focus of this evaluation is to determine the effectiveness of each alternative with respect to the risk posed by treatment of residuals and/or untreated wastes after the cleanup criteria have been achieved. Several components were addressed in making the determinations, including:
  - Magnitude of residual risk from the alternative.
  - Likelihood that the alternative will meet process efficiencies and performance specifications.
  - Adequacy and reliability of long-term management controls providing continued protection from residuals.
  - Associated risks in the event the technology or permanent facilities must be replaced.
4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** refers to the preference for a remedy that reduces health hazards of contaminants, the movement of contaminants, or the quantity of contaminants at the Petrochem/Ekotek Site through treatment. This criterion evaluates the ability of the alternatives to significantly achieve reduction of the toxicity, mobility, or

volume of the contaminants or wastes at the site, through treatment. The criterion is a principal statutory requirement of CERCLA. This analysis evaluates the quantity of contaminants treated and destroyed, the degree of expected reduction in toxicity, mobility, or volume measured as a percentage of reduction, the degree to which the treatment will be irreversible, the type and quantity of residuals produced, and the manner in which the principal threat will be addressed through treatment. The risk posed by residuals will be considered in determining the adequacy of reduced toxicity and mobility achieved by each alternative.

5. **Short-Term Effectiveness** addresses the period of time needed to complete the remedy, and any adverse effects to human health and the environment that may be caused during the construction and implementation of the remedy. Measures to mitigate releases and provide protection is central to this determination.
6. **Implementability** refers to the technical and administrative feasibility of an alternative or a remedy. This criterion analyzes technical feasibility, administrative feasibility, and the availability of services and materials. Technical feasibility assesses the difficulty of construction or operation of a particular alternative and unknowns associated with process technologies. The reliability of the technologies based on the likelihood of technical problems that would lead to project delays is critical in this determination. The ability to monitor the effectiveness of the alternative is also considered.

Administrative feasibility assesses the ease or difficulty of obtaining permits or rights-of-way for construction. Availability of services and materials evaluates the need for off-site treatment, storage, or disposal services, and the availability of such services. Necessary equipment, specialists, and additional resources are also evaluated in determining the ease by which these needs could be fulfilled. It also includes coordination Federal, State, and local government efforts.

7. Cost evaluates the estimated capital, operation,



and maintenance (O&M) costs of each alternative in comparison to other equally protective alternatives. Alternatives are evaluated for cost in terms of both capital costs and long-term O&M costs necessary to ensure continued effectiveness of the alternatives. Capital costs include the sum of the direct capital costs (materials, equipment, labor, land purchases) and indirect capital costs (engineering, licenses, or permits). Long-term O&M costs include labor, materials, energy, equipment replacement, disposal, and sampling necessary to implement the alternative.

- **Modifying Criteria**

8. **State Acceptance** indicates whether the State agrees with, opposes, or has no comment on the preferred alternative.
9. **Community Acceptance** includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.

The strengths and weaknesses of the alternatives were weighed to identify the alternative providing the best balance among the nine evaluation criteria.

## **9.1 Detailed Analysis of Alternatives**

### **9.1.1 Threshold Criteria**

#### **9.1.1.1 Overall Protection of Human Health and the Environment**

The overall protection of human health and the environment is a threshold criteria that must be met for EPA to select the alternative. Protectiveness is achieved by the remedies if the exposure pathways are either eliminated, reduced to acceptable exposures or controlled through containment.

All of the alternatives, with the exception of alternative 1, protect human health and the environment.

Alternatives 2, 3, 4, 5, 6, 7, 8, 9 and 10 are protective of human health and the environment.

Alternatives 6, 7, 8 and 9 provide protectiveness by removing and treating the soils (to include buried debris), LNAPL and ground water.

Alternatives 3, 4 and 10 provide protectiveness by either offsite disposal or containment on-site of the soils and treatment

of LNAPL and ground water.

Alternative 2 achieves protectiveness through a combination of excavation, offsite disposal, containment and treatment to achieve EPA's acceptable risk range for the site of  $10^{-4}$  to  $10^{-6}$  for the soils (to include buried debris), LNAPL and ground water. Alternative 2 directly addresses the soils that exceed  $10^{-4}$  and contains the low-level contaminated soils ( $10^{-4}$  to  $10^{-6}$ ) onsite.

Alternative 1 does not address the soils exceeding the hot spot criteria. Alternative 1 may also be protective in the ground water if over time the ground water PRG for vinyl chloride can be achieved through natural attenuation. Contamination associated with the LNAPL is a potential source of ground water contamination and this alternative does not address these sources. No remedial actions to contain or remove LNAPL and the soils that exceed the hot spot criteria are included in alternative 1; therefore, this alternative does not address the potential sources and is not protective of the environment.

#### **9.1.1.1.1 Soils (to include buried debris)**

Alternatives 6, 7 and 8 achieve protectiveness through a combination of off-site disposal and on-site thermal treatment of the soils to achieve a  $10^{-6}$  risk level within one year. Alternative 9 uses a combination of disposal and biological treatment (land farming) of the soils to achieve a  $10^{-6}$  in approximately six years.

Alternatives 3, 4 and 10 achieve protectiveness through off-site disposal of the soils exceeding the hot spot criteria and on-site containment of the same volume of soils treated under alternatives 6, 7, 8 and 9.

Alternative 2 achieves protectiveness through excavation and thermal treatment of the soils that exceed  $10^{-4}$  risk and places a cover over the low-level contaminated soils (within the  $10^{-4}$  to  $10^{-6}$  risk range) in the former tank farm area to control and limit exposure to these soils.

#### **9.1.1.1.2 LNAPL**

The percentages of LNAPL removal is approximate and reflects the methods that will be used to extract the LNAPL. Direct excavation is the most aggressive method and is expected to extract as much of the LNAPL as feasible thus rendering a description of approximately 100 percent recoveries. The other method uses trenches, sumps and pumps to extract LNAPL and is less successful, thus resulting in reduced percentages of recovery.

Alternatives 6, 7, 8, 9 and 10 achieve protectiveness by removing

virtually 100 percent of the LNAPL through a combination of excavation, disposal and treatment via thermal desorption onsite and incineration offsite within one year. Little residual, if any, is expected to remain onsite.

Alternative 4 addresses a smaller percent (e.g., 80 percent) of the LNAPL through a combination of removal, disposal and treatment. Some residual is expected to remain onsite, however, migration of the LNAPL is not expected to occur.

Alternatives 2 and 3 remove, dispose and treat a smaller percent (e.g., 75 percent) of the LNAPL. Some residual is expected to remain onsite, however, migration of the LNAPL is not expected to occur.

#### **9.1.1.1.3 Ground Water**

The feasibility study states that alternatives 7 and 8 will achieve  $10^{-6}$  ground water PRGs through physical treatment within six years. Alternative 4 will achieve  $10^{-6}$  ground water PRGs through air sparging within seven years. Alternatives 2, 3, 5, 6, 9 and 10 will achieve  $10^{-6}$  ground water PRGs through intrinsic remediation/attenuation within ten years.

Although it is helpful to have restoration timeframes estimated, it is inappropriate to give excessive weight to these timeframes given their relative similarity and the degree of uncertainty in the parameters used to derive these timeframes. All of the alternatives except Alternative 1 include contingency measures. All of the ground water remedies are protective of human health and the environment.

#### **9.1.1.2 Compliance with Applicable or Relevant and Appropriate Requirements**

Compliance with applicable or relevant and appropriate requirements (ARARs) is a threshold criteria that must be met by the selected remedy. Compliance with ARARs requires that the remedy comply with the substance of the environmental Federal and State laws that address the circumstances of the site and the remediation.

All of the alternatives, with the exception of alternative 1, comply with Applicable or Relevant and Appropriate Requirements - (ARARs).

Contingency measures have been developed for containment of the ground water plume and treatment of arsenic so that all alternatives can achieve the ARARs, except the No Further Action Alternative. Alternatives 4, 7 and 8 do not require the containment contingency measure but do require the arsenic contingency measure. Alternatives 2, 3, 5, 6, 9 and 10 require

both the containment and arsenic contingency measures.

### **9.1.2 Balancing Criteria**

The balancing criteria include long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. The remedial alternatives were evaluated and ranked as to how the balancing criterion are achieved with respect to the response actions taken within the three media (i.e., soils, LNAPL and ground water). To adequately address the balancing criteria, there must be an understanding of the relative risk among the media. The contaminants within the soils represent a low-level threat (i.e.,  $9.75 \times 10^{-5}$ ). The contaminants within the LNAPL represent a principal threat. The contaminants within the ground water represent a risk greater than EPA's upper boundary of the acceptable risk range (i.e.,  $10^{-4}$ ).

#### **9.1.2.1 Long-term Effectiveness and Permanence**

Long-term effectiveness and permanence are evaluated as the reliability of protection over time. The alternatives will be ranked as to the time it takes to achieve long-term effectiveness and permanence, the permanence of the treatment, effectiveness of the technology and the amount of residuals left onsite.

EPA's acceptable risk range is  $10^{-4}$  -  $10^{-6}$ . To be considered protective, the remedies must protect within this range.

Alternatives 6, 7, 8, 9 and 10 achieve the highest overall level of long-term effectiveness and permanence by permanently removing the principal threat and potential source of the ground water contamination through direct excavation of the LNAPL. All of the alternatives, with the exception of alternative 1, achieve the same level of ground water long-term effectiveness. Alternatives 6, 7, 8 and 9 treat the low-level contaminated soils. Alternative 10 achieves protectiveness through containment onsite by placing the low-level contaminated soils under a 42-inch soil cap or 6 inch asphalt cap.

##### **9.1.2.1.1 Soils (to include buried debris)**

All of the alternatives, with the exception of the No Further Action alternative, remove soils that exceed  $10^{-4}$  so that the remaining soils are considered low-level contaminated soils. Actions are taken to either treat, dispose, or contain the remaining low-level contaminated soils (within  $10^{-4}$  -  $10^{-6}$ ).

Alternatives 5, 6, 7, and 8 achieve the highest degree of long-term effectiveness through permanent treatment of the soils. Alternatives 5, 6, 7, and 8 thermally desorb the soils that exceed soil PRGs and dispose the soils that exceed soil hot spot

criteria offsite within one year. Thermal desorption of these soils is permanent and is not expected to result in residual risk either through the treatment residuals or lack of completeness of treatment of the soils to  $10^{-6}$ . The disposal of the soils that exceed soil hot spots criteria permanently removes the risk posed by these soils from the site.

Alternative 9 also achieves a high degree of long-term effectiveness through permanent treatment of the soils; however, the effectiveness of land farming has not been demonstrated for this site and thus is not considered as effective as the proven technology of thermal desorption used in alternatives 5, 6, 7 and 8. Alternative 9 biologically treats through land farming the soils that exceed soil PRGs to  $10^{-6}$  risk and disposes the soils that exceed soil hot spot criteria offsite. The land farming degradation of the soils is permanent and takes six years. The disposal of the soils that exceed soil hot spots criteria permanently removes the risk posed by these soils from the site.

Alternative 4 also has a high degree of long-term effectiveness through disposal offsite. Offsite disposal removes the risk from the site by transporting that risk to a controlled facility (e.g., solid waste landfill). It does permanently remove the risk from the site but offsite disposal is not considered preferable to treatment. Alternative 4 removes, and disposes offsite, soil that exceed the soil hot spot criteria and soils that exceed the soil PRGs. The disposal of these soils offsite permanently removes the risk posed by these soils from the site so that no remaining risks from the soils exist.

Alternative 2 provides a medium degree of long-term effectiveness because it uses a combination of treatment, and containment or control technologies and institutional controls to prevent exposure to the low-level contaminated soils within large areas of the site. Alternative 2 thermally desorbs 330 CY of hot spot surface soil; 2,300 CY of soils associated with the former UST #2 exceeding soil PRGs; and 700 CY of offsite soils exceeding soil PRGs to attain the soil PRGs of  $10^{-6}$  risk within one year. Thermal desorption of these soils is permanent and is not expected to result in residual risk either through the treatment residuals or lack of completeness of treatment of the soils to  $10^{-6}$ . The low-level contaminated soils in the former tank farm and buried debris areas are contained with soil covers and a slurry wall. The containment of the soils that exceed the soil PRGs using caps and slurry wall is not permanent and relies upon continued maintenance to remain effective. The remaining soils within EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$  are not covered.

Alternatives 3 and 10 provide the lowest degree of long-term effectiveness because they rely upon a combination of offsite disposal, containment or control technologies and institutional

controls to prevent exposure to low-level contaminated soils within large areas of the site. Alternatives 3 and 10 consolidate and contain the soils that exceed the soil PRGs and dispose the soils that exceed soil hot spot criteria offsite. The disposal of the soils that exceed soil hot spots criteria permanently removes the risk posed by these soils from the site. The containment of the remaining soils within EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$  which exceeds the soil PRGs uses soil covers and slurry walls which are not permanent and rely upon continued maintenance to remain effective.

Alternative 1 provides no long-term effectiveness as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants that contribute to risk in the soils.

#### **9.1.2.1.2 LNAPL**

Of the three media evaluated, the LNAPL and LNAPL saturated soils contribute the greatest risk to the site. Alternatives 6, 7, 8, 9 and 10 provide the greatest degree of long-term effectiveness through a combination of on- and offsite treatment of LNAPL and soils saturated with LNAPL. Alternatives 6, 7, 8, 9 and 10 remove and treat approximately 100 percent of the LNAPL and LNAPL saturated soils via either onsite thermal desorption of LNAPL saturated soils or offsite disposal and offsite incineration of LNAPL. Thermal desorption of the LNAPL saturated soils is permanent and is not expected to result in residual risk either through the treatment residuals or lack of completeness of treatment of the LNAPL saturated soils to  $10^{-6}$ . The removal of LNAPL saturated soils through offsite disposal is considered permanent. The removal offsite and incineration of the LNAPL will permanently reduce the risk posed by the LNAPL from the site.

Alternatives 4 and 5 provide a medium degree of long-term effectiveness through partial on- and offsite treatment of the soils saturated with LNAPL and LNAPL. Alternatives 4 and 5 partially remove and treat approximately 80 percent of the LNAPL offsite via incineration. The excavated soils saturated with LNAPL from the construction of the trenches will be thermally desorbed onsite. The removal and treatment of the LNAPL offsite permanently reduce the risk to the site, however, residual risk remains from approximately 20 percent of the unrecovered LNAPL and from the soils saturated with LNAPL that were not encountered during construction and therefore not treated via thermal desorption.

Alternatives 2 and 3 provide the lowest degree of long-term effectiveness because they treat less contaminants than the other alternatives. Alternatives 2 and 3 partially remove and treat approximately 75 percent of the LNAPL offsite via incineration. The excavated soils saturated with LNAPL from the construction of

the trenches will be thermally desorbed onsite. The removal and treatment of the LNAPL offsite permanently reduce the risk to the site; however, residual risk remains from approximately 25 percent of the unrecovered LNAPL and from the soils saturated with LNAPL that were not encountered during construction and therefore not treated via thermal desorption.

Alternative 1 provides no long-term effectiveness as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants associated with and in the LNAPL that contribute to risk in the ground water.

#### **9.1.2.1.3 Ground Water**

All the alternatives achieve long-term effectiveness through the reduction of the concentrations of the contaminants in the ground water to  $10^{-6}$  risk.

Although it is helpful to have restoration timeframes estimated, it is inappropriate to give excessive weight to these timeframes for ranking purposes given their relative similarity and the degree of uncertainty in the parameters used to derive these timeframes. All of the ground water remedies provide long-term effectiveness.

There are two contingency measures that will be initiated if any of the ground water remedies fail to either contain the ground water plume or treat arsenic that exceeds the ground water PRGs, so that all alternatives can achieve long-term effectiveness. Alternatives 4, 7 and 8 do not require the containment contingency measure but do require the arsenic contingency measure. Alternatives 2, 3, 5, 6, 9 and 10 require both the containment and arsenic contingency measures to contain the plume or treat the contamination to the ground water PRGs. These contingencies add time to the restoration but will achieve long-term effectiveness over time.

Alternative 1 provides no long-term effectiveness as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants that contribute to risk in the ground water plume.

#### **9.1.2.2 Reduction of Toxicity, Mobility and Volume Through Treatment**

The alternatives are ranked according to the reduction of toxicity, mobility, or volume through treatment. Those remedies that include treatment of the larger quantities of contaminants are ranked higher than other alternatives.

Alternatives 6, 7, 8 and 9 achieve the highest overall degree of reduction of toxicity, mobility and volume (TMV) through treatment by reducing the toxicity and volume of a larger volume

of contaminants than the other alternatives.

#### **9.1.2.2.1 Soils (to include buried debris)**

Thermal desorption of the soil reduces the toxicity by destroying the contaminants that contribute to risk. Thermal desorption of these soils is permanent and is not expected to result in residual risk either through the treatment residuals or lack of completeness of treatment of the soils to  $10^{-6}$ .

Alternatives 5, 6, 7, and 8 achieve the highest degree of reduction of TMV through treatment of approximately 22,000 CY of low-level contaminated soils. Alternatives 5, 6, 7, and 8 thermally desorb the soils that exceed soil PRGs and dispose of the soils that exceed soil hot spot criteria offsite within one year. Thermal desorption of the soil reduces the toxicity by destroying the contaminants that contribute to risk. The disposal of the soils that exceed soil hot spots criteria reduces the volume of the contaminants onsite.

Alternative 9 also achieves a high degree of reduction of TMV through treatment of approximately 22,000 CY of low-level contaminated soils; however, the effectiveness of land farming has not been demonstrated for this site and thus is not considered as effective as the proven technology of thermal desorption used in alternatives 5, 6, 7 and 8. Alternative 9 biologically treats (land farming) the soils that exceed soil PRGs to  $10^{-6}$  risk and disposes of the soils that exceed soil hot spot criteria offsite. The land farming degradation of the soils reduces the toxicity of the contaminants by changing the contaminants via degradation to less toxic constituents. The disposal of the soils that exceed soil hot spot criteria reduces the volume of the contaminants onsite.

Alternative 4 has a medium degree of reduction of TMV through treatment by reducing the volume of contaminants onsite by disposing approximately 22,000 CY of low-level contaminated soils offsite. Offsite disposal reduces the volume of the contaminants onsite by transporting soils that exceed the soil PRGs to a controlled facility (e.g., solid waste landfill). Offsite disposal is not considered preferable to treatment. Alternative 4 removes and disposes offsite soils that exceed the soil hot spot criteria and soils that exceed the soil PRGs. The disposal of these soils offsite reduces the volume of contaminants onsite.

Alternative 2 provides a medium degree of reduction of TMV through treatment. Alternative 2 reduces toxicity through treatment, and reduces mobility through containment. Alternative 2 uses a combination of treatment, and containment or control technologies and institutional controls to prevent exposure to low-level contaminated soils within large areas of the site. Alternative 2 thermally desorbs 330 CY of hot spot surface soil;



2,300 CY of soils associated with the former UST #2 exceeding soil PRGs; and 700 CY of offsite soils exceeding soil PRGs to attain the soil PRGs of  $10^{-6}$  risk within one year. Alternative 2 thermally desorbs; a smaller amount of soils than the amount of soil treated in alternatives 5, 6, 7, 8 and 9. The soils within EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$  in the former tank farm and buried debris areas are contained with soil covers and a slurry wall. The containment of the soils that exceed the soil PRGs through the use of soil covers and slurry walls reduce the mobility of the contaminants in the soils. The remaining soils within EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$  are not covered.

Alternatives 3 and 10 provide no degree of reduction of TMV through treatment. Alternatives 3 and 10 rely upon a combination of offsite disposal, containment or control technologies and institutional controls to prevent exposure to large areas of the site. Alternatives 3 and 10 consolidate and contain the soils that exceed the soil PRGs and dispose the soils that exceed soil hot spot criteria offsite. Offsite disposal reduces the volume of the contaminants onsite by transporting soils that exceed the soil PRGs to a controlled facility (e.g., solid waste landfill). Offsite disposal is not considered preferable to treatment. Alternative 3 contains the low-level contaminated soils with a slurry wall and soil/clay cap. Alternative 10 contains the low-level contaminated soils under a 42 inch soil cover. Consolidation and containment reduce the mobility of the soils that exceed the soil PRGs, however, this reduction of mobility is not achieved through treatment.

Alternative 1 provides no reduction of TMV through treatment as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants that contribute to risk in the soils.

#### **9.1.2.2.2 LNAPL**

Of the three media evaluated, the LNAPL and LNAPL saturated soils contribute the greatest risk to the site, thus the treatment of the LNAPL provides the greatest degree of reduction of TMV through treatment. Alternatives 6, 7, 8, 9 and 10 achieve the highest degree of reduction of TMV through treatment with a combination of on- and offsite treatment of LNAPL and soils saturated with LNAPL. Alternatives 6, 7, 8, 9 and 10 remove and treat approximately 100 percent of the LNAPL and LNAPL saturated soils via either onsite thermal desorption or offsite disposal of LNAPL saturated soils and offsite incineration of LNAPL. Thermal desorption of the soil reduces the toxicity by destroying the contaminants that contribute to risk. The removal of the LNAPL for offsite incineration reduces the volume of contamination on site but also permanently reduces the toxicity of the contaminants by thermal destruction.

Alternatives 4 and 5 achieve a medium degree of reduction of TMV through treatment by reducing the toxicity and volume of the contaminants within the LNAPL. Alternatives 4 and 5 removes approximately 80 percent of the LNAPL at the site. The LNAPL is sent offsite to an incinerator. The removal of the LNAPL reduces the volume of contaminants at the site. The excavated soils saturated with LNAPL from the construction of the trenches will be thermally desorbed onsite. Thermal desorption of the soil reduces the toxicity by destroying the contaminants that contribute to risk. The removal and treatment of the LNAPL offsite reduce the volume of contaminants on the site; however, residual risk remains from approximately 20 percent of the unrecovered LNAPL and from the soils saturated with LNAPL that were not encountered during construction and therefore not treated via thermal desorption.

Alternatives 2 and 3 achieve the lowest degree of reduction of TMV through treatment because they treat less contaminants than the other alternatives. Alternatives 2 and 3 partially remove and treat approximately 75 percent of the LNAPL offsite via incineration. The excavated soils saturated with LNAPL from the construction of the trenches will be thermally desorbed onsite. Thermal desorption of the soil reduces the toxicity by destroying the contaminants that contribute to risk. The removal and treatment of the LNAPL offsite permanently reduce the risk to the site, however, residual risk remains from approximately 25 percent of the unrecovered LNAPL and from the soils saturated with LNAPL that were not encountered during construction and therefore not treated via thermal desorption.

Alternative 1 provides no reduction of TMV through treatment as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants associated with and in the LNAPL that contribute to risk in the ground water.

#### **9.1.2.2.3 Ground Water**

All the alternatives achieve reduction of TMV through treatment through the reduction of the concentrations of the contaminants in the ground water to  $10^{-6}$  risk; however, the proven effectiveness of the technologies to achieve the  $10^{-6}$  risk differs with each type of treatment.

Alternatives 4, 7 and 8 are ranked as achieving a medium degree of reduction of TMV through treatment for ground water. These systems actively treat the contaminants through air sparging, discharge to POTW, and UV oxidation/reinjection, respectively. Although these systems are proven technologies at other Superfund sites, the physical characteristics at the Petrochem site are not conducive to pump and treat systems which is why this proven technology has been given a medium ranking. It should be noted that the contingency containment measure, if implemented, would

be to the northwest of the site and does not share the same physical characteristics as the area where these active treatment systems would be implemented. Alternatives 7 and 8 achieve  $10^{-6}$  risk in approximately 6 years. Alternative 4 achieves  $10^{-6}$  risk in approximately 7 years. There are no treatment residuals associated with air sparging, discharge to POTW, and UV oxidation/reinjection.

Alternatives 2, 3, 5, 6, 9 and 10 are ranked as achieving a medium degree of reduction of TMV through intrinsic remediation of ground water because intrinsic remediation/attenuation has not been demonstrated at this site. Studies to quantify the rate of degradation of vinyl chloride to the less toxic constituents of ethene and ethane are part of RD. There are no treatment residuals associated with intrinsic remediation.

One of two, or both contingency measures will be initiated if the ground water remedies fail to contain the ground water plume within the compliance boundary or if arsenic exceeds the ground water PRGs within the contaminated plume. With the implementation of one or both of the contingencies, all of the alternatives achieve long-term effectiveness. Alternatives 4, 7 and 8 do not require the containment contingency measure but do require the arsenic contingency measure. Alternatives 2, 3, 5, 6, 9 and 10 require both the containment and arsenic contingency measures.

Alternative 1 provides no reduction of TMV through treatment as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants that contribute to risk in the ground water plume.

#### **9.1.2.3 Short-term Effectiveness**

All of the alternatives are designed to be protective of both the community and workers during implementation of the remedies. The alternatives will be ranked by how quickly the remedies are implemented and the amount of mitigating components that are needed to ensure protectiveness or reduce exposure during implementation. The alternatives that are achieved quickly shall be rated as having the highest degree of short-term effectiveness. The alternatives that require more mitigating components than others shall be ranked lower than those that require few mitigating components to ensure protectiveness during implementation.

All the alternatives include the removal of the liner, concrete wall and slab, and two tanks in the former tank farm area for disposal at a TSCA, hazardous or solid waste facility. Approximately 600 CY of soils excavated during the tank removal will be disposed either in a TSCA, hazardous or solid waste landfill.

Alternatives 2, 3, and 10 provide the greatest overall degree of short-term effectiveness.

#### **9.1.2.3.1 Soils (to include buried debris)**

Alternatives 2, 3, and 10 provide the greatest degree of short-term effectiveness in that the soils remedy can be implemented within one year and offer little exposure to the workers and community. Alternatives 2, 3 and 10 excavate fewer CY of soil and minimize the disruption of the area for the consolidation of the soils that exceed the soil PRGs. These alternatives have the least amount of exposure to the community and workers during implementation and a lesser amount of mitigating components. Alternative 10 includes the demolition of two buildings; however, this activity has not been factored into short-term effectiveness evaluation because the buildings do not pose a risk to workers. The mitigating components include using foam to control dust and odors during excavation and wearing personal protective equipment.

Alternatives 4, 5, 6, 7, and 8 provide a moderate degree of short-term effectiveness in that the soils remedy can be implemented within one year albeit with a greater degree of exposure to the workers and community and more mitigating components. Alternatives 4, 5, 6, 7, and 8 disturb through excavation approximately 22,000 CY which is at least twice as much excavation as alternatives 2, 3, and 10.

The mitigating components include using foam to control dust and odors during excavation and wearing personal protective equipment. More foam will be used because a greater quantity of soil will be excavated than specified in alternatives 2, 3, and 10. Alternatives 6, 7, and 8 also require a vapor enclosure to control potential dust, organic vapor, or odor emissions from the excavation of the buried debris area.

Alternative 9 offers the lowest degree of short-term effectiveness in that biological treatment (land farming) of the soils is expected to take six years and more mitigating components are needed to reduce exposure during implementation. The mitigating components include using foam to control dust and odors during excavation and wearing personal protective equipment. More foam will be used due to the greater quantity of soil that will be excavated than the quantities identified in alternatives 2, 3, and 10. Alternative 9 also requires a vapor enclosure (the necessity of which will be determined during RD) to control potential dust, organic vapor, or odor emissions from the excavation of the buried debris area.

Alternative 1 was not ranked for short-term effectiveness as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants that contribute to risk in the soils and

therefore time and mitigating components are not relevant.

#### **9.1.2.3.2 LNAPL**

Alternatives 6, 7, 8, 9, and 10 provide the greatest degree of short-term effectiveness in that the LNAPL is removed through direct excavation in less than one year. Although alternatives 6, 7, 8, 9 and 10 expose more LNAPL to the workers (100% recovery vs. 75% or 80% recovery), the duration of the exposure is two years less than other alternatives so the net effect is less total exposure. The mitigating components include using foam to control dust and odors during excavation and wearing personal protective equipment. The thermal desorption of the soils saturated with LNAPL will occur onsite and emissions from the unit will be monitored throughout the duration of operations.

Alternatives 2, 3, 4, and 5 provide a moderate degree of short-term effectiveness in that the LNAPL is exposed and treated over a period of three years. Alternatives 2, 3, 4, and 5 use a series of excavated trenches and extraction pumps to recover the LNAPL. To recover approximately 75-80 percent of the LNAPL, this system is expected to operate for three years. Workers and the community will be exposed during operation of the system. The mitigating components include using foam to control dust and odors during excavation and wearing personal protective equipment. The thermal desorption of the soils saturated with LNAPL will occur onsite and emissions from the unit will be monitored throughout the duration of operations.

Alternative 1 was not ranked for short-term effectiveness as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants associated with the LNAPL that contribute to risk to the ground water and therefore time and mitigating components are not relevant.

#### **9.1.2.3.3 Ground Water**

Alternatives 2, 3, 5, 6, 9, and 10 provide the greatest degree of short-term effectiveness through the use of intrinsic remediation/attenuation. Intrinsic remediation/attenuation is expected to achieve the ground water PRGs within 10 years. Intrinsic remediation is expected to occur naturally and does not involve mechanical activity (with the exception of enhancements, if needed). Exposure to the workers and the community is not expected to occur.

Alternatives 4, 7 and 8 provide a medium degree of short-term effectiveness in that the technologies require mechanical activity and transfer of water to the surface where exposure may occur. Alternative 4 uses air sparging and vapor extraction; alternative 7 uses extraction and discharge to POTW; and alternative 8 uses UV oxidation and reinjection to the aquifer.

Although all of these technologies are closed systems and are not expected to expose either the workers or the community during implementation, the potential is greater than when compared to in situ intrinsic remediation/attenuation.

Alternative 1 was not ranked for short-term effectiveness as no actions will be taken to contain, remove, reduce, immobilize or treat the contaminants in the ground water and therefore time and mitigating components are not relevant.

#### **9.1.2.4 Implementability**

The alternatives are ranked according to difficulty of construction or operation of the remedy; the available site-specific data to support the likelihood of success of the remedy; the reliability of the technologies (to include likelihood of technical problem in the field); the ability to monitor the effectiveness of the alternative; the reliance upon institutional controls to maintain protectiveness; and the availability of services, equipment and materials.

The alternatives shall be ranked with respect to each other and not to other technologies that are not being considered at the Petrochem/Ekotek site.

All of the alternatives have access restrictions to the site which may include fencing, signs, security checks, etc. during the implementation of the remedies.

Alternatives 4 and 10 are the most overall implementable remedies.

##### **9.1.2.4.1 Soils (to include buried debris)**

Alternatives 3, 4 and 10 are the most implementable alternatives in that caps, slurry walls, and disposal offsite are easily constructed with few problems in the field; have a high degree of success; are easy to monitor; and the services, equipment and materials are readily available. Excavation, landfill disposal, soil covers/caps and slurry walls are all proven technologies that have been employed at numerous Superfund sites. Soil covers/caps and landfill disposal are more implementable than slurry walls. Monitoring the integrity of a soil cover/cap to contain soils is straight forward and can be completed through visual inspections. The integrity of the slurry wall to contain soils has to be ensured at completion of construction as visual inspections will not be possible after construction. Monitoring of the slurry wall to contain ground water contamination requires strategic placement of wells with periodic sampling. If contaminants are found outside the slurry wall the integrity of the wall has been breached. Alternatives 2, 3, and 10 rely upon institutional controls to ensure protectiveness. Deed or

water use restrictions, while a commonly utilized institutional control to limit or restrict uses of a property, must be coordinated with the appropriate agencies. Deed restrictions are effective and permanent, based on their performance at other Superfund sites, as long as proper coordination and enforcement is maintained.

Alternatives 2, 5, 6, 7, 8, and 9 are moderately implementable alternatives as compared to alternatives involving containment remedies (e.g., caps and slurry walls) in that they all use technologies that are effective but may have problems in the field. Alternatives 2, 5, 6, and 7 use onsite thermal desorption for the treatment of the soils. Although thermal desorption has been used on numerous Superfund sites, the likelihood for difficulties in the field is average and should be anticipated. Field operations should include some time to rectify problems. Although alternative 2 thermally desorbs at a smaller scale (3,300 CY vs. 22,000 CY) than alternatives 5, 6, 7, and 8, the mobilization and types of problems that will occur in the field are expected to be similar. Alternative 9 uses, biological treatment (land farming) to treat the contaminants in the soils. Land farming has not been demonstrated to be effective at the Petrochem/Ekotek site. A study would have to be conducted during RD to determine the effectiveness of land farming and to determine the time frame for the degradation of the contaminants in the soils to reduce the risk to  $10^{-6}$ . Services, equipment and material a readily available.

Alternative 1 was not ranked for implementability as, no actions will be implemented to contain, remove, reduce, immobilize or treat the contaminants in the soils.

#### **9.1.2.4.2 LNAPL**

Alternatives 6, 7, 8, 9 and 10 are the most implementable because they involve direct excavation of the LNAPL and soils saturated with LNAPL for treatment on- and offsite. The soils saturated with LNAPL will be thermally desorbed onsite while the LNAPL will be incinerated offsite. Direct excavation and offsite disposal are proven technologies and experience few problems in the field. Direct excavation is expected to recover approximately 100 percent of the LNAPL at the site. Services, equipment and materials are readily available.

Alternatives 2, 3, 4, and 5 are moderately implementable as compared to alternatives involving direct excavation. Alternatives 2, 3, 4, and 5 include installation of a network of trenches and extraction sumps to recover the LNAPL. The excavation of the trenches is similar to direct excavation of the LNAPL and will remove approximately 25 percent of the LNAPL. The extraction system involves extraction sumps which may experience

problem in the field. The operations and maintenance of the extraction system are expected to occur over a three-year period. Skimmers will be used in conjunction with extraction sumps to remove the LNAPL. The direct excavation of the trenches and the recovery of the LNAPL via extraction sumps are expected to remove approximately 75 to 80 percent of the LNAPL at the site. The soils saturated with LNAPL will be thermally desorbed onsite while the LNAPL will be incinerated offsite. Services, equipment and materials are readily available.

Alternative 1 was not ranked for implementability as no actions will be implemented to contain, remove, reduce, immobilize or treat the contaminants in the LNAPL that may contribute to the risk in the ground water.

#### **9.1.2.4.3 Ground Water**

Alternative 4 is the most implementable ground water remedy. Alternative 4 uses the proven technology of air sparging/vapor extraction to treat the contaminants in the ground water to the ground water PRGs. Air sparging is an insitu treatment that is easily maintained and reliable. Services, equipment and materials are readily available.

Alternatives 2, 3, 5, 6, 7, 9, and 10 are moderately implementable. All of these alternatives involve technologies that have been successful at Superfund sites. Alternatives 2, 3, 5, 6, 9, and 10 rely upon intrinsic remediation/attenuation which has not been demonstrated to be effective at the Petrochem/Ekotek site. If intrinsic remediation/attenuation is shown to be effective at the Petrochem/Ekotek site however, it is expected to be easily implementable because it is in situ and involves minimal mechanical enhancements. Alternative 7 extracts the contaminated ground water via pumping and discharges it to a POTW. The POTW is a successful means of treating the ground water once it has been extracted. It is the extraction and capture of the contaminated ground water at this Petrochem/Ekotek site that reduces the implementability of this technology. The contaminated aquifer beneath the site has high hydraulic conductivities, is shallow and lies upon a layer of geothermal water. The geothermal water contains high TDS (salts). The ability of the extraction system to efficiently capture the contaminated water without mixing it with the geothermal waters beneath may cause difficulties in the design and implementation of alternative 7. The capture of noncontaminated waters and geothermal waters increases the amount of water to be treated unnecessarily and may cause treatment difficulties for the POTW.

Alternative 8 is the least implementable alternative in that UV oxidation as the treatment component is not reliable and maintainable in the field. Although UV oxidation has been performed at a full-scale level at some Superfund sites, EPA has



found that UV oxidation is one of the technologies that have the poorest record for reliability and maintainability in the field. Alternative 8 shares the same extraction and capture problems as alternative 7.

Alternative 1 was not ranked for implementability as no actions will be implemented to contain, remove, reduce, immobilize or treat the contaminants in the ground water that may contribute to risk.

#### 9.1.2.5 Cost

The alternatives will be ranked in accordance with their 30-year Present Worth Cost (PWC) which includes Capital, and Operation and Maintenance (O&M) Costs for the combined remediation of soils (to include buried debris), LNAPL and ground water. Judgements will be made as to the certainty of the costs as it relates to the characterization of the site.

The following are the costs for each of the alternatives:

- Alternative 1
  - Capital Costs: \$ 900,000
  - Annual O&M \$ 0
  - 30-year PWC \$ 900,000
- Alternative 2
  - Capital Costs: \$ 2,400,000
  - Annual O&M \$ 2,800,000
  - 30-year PWC \$ 5,200,000
- Alternative 3
  - Capital Costs: \$ 3,600,000
  - Annual O&M \$ 2,100,000
  - 30-year PWC \$ 5,700,000
- Alternative 4
  - Capital Costs: \$ 7,200,000
  - Annual O&M \$ 3,700,000
  - 30-year PWC \$10,900,000
- Alternative 5
  - Capital Costs: \$ 3,600,000
  - Annual O&M \$ 6,200,000
  - 30-year PWC \$ 9,800,000
- Alternative 6
  - Capital Costs: \$ 6,900,000
  - Annual O&M \$ 7,300,000
  - 30-year PWC \$14,200,000
- Alternative 7

- Capital Costs: \$ 6,800,000
- Annual O&M \$ 9,800,000
- 30-year PWC \$16,600,000
  
- Alternative 8
  - Capital Costs: \$ 7,200,000
  - Annual O&M \$17,200,000
  - 30-year PWC \$24,400,000
  
- Alternative 9
  - Capital Costs: \$11,000,000
  - Annual O&M \$ 7,000,000
  - 30-year PWC \$18,000,000
  
- Alternative 10
  - Capital Costs: \$ 4,900,000
  - Annual O&M \$ 1,200,000
  - 30-year PWC \$ 6,100,000

Alternatives 2, 3, and 10 are the least costly remedies, ranging in PWC of \$5,200,000 - \$6,100,000 (within 25 percent of each other).

Alternatives 4 and 5 are the next less costly remedies, ranging in PWC of \$9,800,000 - \$10,900,000 or approximately 2 times greater than the least costly remedies. Alternatives 4 and 5 include excavation, offsite disposal and treatment of large areas and volumes of soil and LNAPL which introduce uncertainty due to the potential for volume increases (greater extent of contamination not characterized in the RI). Costs for the excavation, offsite disposal and treatment of a greater volume would increase the PWC for these alternatives.

Alternatives 6, 7 and 9 are in the next tier of more costly remedies, ranging in PWC of \$14,200,000 - \$18,000,000 or approximately 3 times greater than the least costly remedies.

Alternatives 6, 7 and 9 have uncertainties associated with the cost with respect to the buried debris area. The current estimate includes excavation of 14,000 CY; however, the extent of contaminated soils may be greater than this estimate. Therefore the costs associated with the buried debris may actually be higher than estimated. Alternatives 6, 7 and 9 also include excavation and treatment of large areas and volumes of soil and LNAPL which introduce uncertainty due to the potential for volume increases (greater extent of contamination not characterized in the RI). Costs for the excavation and treatment of a greater volume would increase the PWC for these alternatives.

Alternative 8 is the most costly remedy with a PWC of \$24,400,000 which is approximately 4.5 times greater than the least costly protective remedy (i.e., alternative 2). There may be

uncertainty associated with this cost with respect to the buried debris area. The current estimate includes excavation of 14,000 CY; however, the extent of contaminated soils may be greater than this estimate. Therefore, the costs associated with the buried debris may actually be higher than estimated. Alternative 8 also includes excavation and treatment of large areas and volumes of soil and LNAPL which introduces uncertainty due to the potential for volume increases (greater extent of contamination not characterized in the RI). Costs for the excavation and treatment of a greater volume would increase the PWC for this alternative.

### **9.1.3 Modifying Criteria**

State and community acceptance are modifying criteria that shall be considered in the remedy selection.

#### **9.1.3.1 State Acceptance**

EPA received comment from the Director of the State of Utah, Department of Environmental Quality, Division of Environmental Response and Remediation. The State supports the selection of alternative 7, which was identified in the Proposed Plan and at the July 26, 1995 public meeting as EPA's preferred alternative.

#### **9.1.3.2 Community Acceptance**

Community input on the alternatives was solicited by EPA and UDEQ during the public comment period from July 10, 1995 through October 23, 1995. Comments received from the public were mixed in their support for different alternatives.

The Salt Lake City-County Health Department Division of Environmental Health supports the selection of alternative.

The following local governments, citizen groups and persons support the selection of alternative 6:

- The Capitol Hill Neighborhood Council/TAG
- The Community Action Program
- Salt Lake City Mayor Deedee Corradini
- Sierra Club Utah Chapter
- Ten residents of Swedetown

The following citizen groups and persons support the selection of alternative 10:

- Salt Lake Area Chamber of Commerce
- Representative from Woodward-Clyde
- Representative from ITEX
- Member of Capital Hill Community
- Representative from Morrison Knudsen Corporation

the following PRP groups support the selection of alternative 10:

- Ekotek-Site Remediation Committee and its de minimis settlers
- One hundred and eleven Liaison Defendants in civil action Ekotek Site PRP Committee v. Self et al., Civil no. 94-C-277K, US District Court, Utah
- Kennecott Utah Copper Corporation

Additional public comment received by EPA criticizes EPA, questions the results of the Aquifer Characterization Report and suggests that settlers be reimbursed for paying more than their proportion of the total costs.

Responses to the community and PRP comments are found in the Responsiveness Summary in Section 13.0 of this ROD.

**Section 10.0**  
**Selected Site Remedy**

## **Section 10.0 Selected Site Remedy**

Upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and State and public comments, the EPA, in consultation with UDEQ and having considered UDEQ's comments submitted supporting selection of Alternative 7, has determined that the most appropriate remedy for the Site is **Alternative 10 - Remove/Dispose Hot Spot Soils; Consolidate/Cap Soils that Exceed PRGs; Partial Removal/Disposal of Soil and Buried Debris and Cap Remaining Debris; Remove/Treat 100% LNAPL; Intrinsic Remediation of Ground Water; and Access and Land Use Restrictions** for the Petrochem/Ekotech site located in Salt Lake City, Utah.

The purpose of this response action is to eliminate the pathway of direct exposure to soils of an industrial worker through excavation and offsite disposal of hot spot soils; containment onsite of low-level contaminated soils under 42-inch soil cap; eliminate partitioning of LNAPL to the ground water through removal and treatment of LNAPL; and eliminate the potential future ingestion of contaminated drinking water through intrinsic remediation/attenuation of the ground water.

All specified volumes are estimates derived from the data collected during the RI/FS and are intended to be approximate volumes for the development of the remedial alternatives. The actual volumes will be determined during the RA and will include the extent of contamination as defined by the performance standards. For example, volume of soils will be defined by the soil volume that exceeds the soil hot spot criteria or soil performance standards.

### **Section 10.1 Components of the Selected Site Remedy**

The components of the selected remedy are described and are detailed below:

#### **Demolition**

- The liner, concrete wall and slab, and two 1,000 gallon capacity tanks will be reserved from the former tank farm area for disposal in a TSCA, or RCRA hazardous or solid waste permitted landfill.
- The main warehouse and metal warehouse buildings shown on Figure 2 will be demolished and disposed off-site in a permitted RCRA Subtitle D solid waste landfill.

#### **Soils and Buried Debris**

Soils are classified into three types. Each type has distinct remediation requirements. Figure 8.9.10.1 illustrates the soils and debris to be remediated.

*Hot Spots.* Hot spots are soils exceeding the Hot Spot Performance Standards specified in Section 10.1.2. Based upon the RI/FS data, a total of 330 CY of soil is estimated to exceed these levels. It is believed that 200 CY of the 330 CY contains PCBs which requires off-site disposal to a permitted TSCA landfill. The remaining 130 CY of hot spot soils will be disposed in an off-site RCRA permitted Subtitle D solid waste landfill.

*Soils in the former tank farm.* An estimated 13,700 CY of soils in the former tank farm exceeds the Soil Performance Standards listed in Section 10.1.2. Other soils described below also exceeding soil performance standards will be consolidated with these soils on the former tank farm. Clean soil at a depth of 42 inches will be placed on top of all these soils after consolidation. This soil cover will extend over an estimated 10,000 SY (8,000 SY over the former tank farm and 2,000 SY over the debris area).

*Soils outside the former tank farm exceeding soil performance standards.* An estimated additional 7,300 CY of on-site soils exceeds PRGs, including approximately 5,000 CY in the eastern and southern parts of the site and 2,300 CY in the former #2 UST area. And an additional 700 CY of soils immediately adjacent to the northern boundary of the facility also exceed PRGs. All soils exceeding soil performance standards will be excavated and consolidated on the former tank farm and covered with 42 inches of clean soil as described above. The excavations will be backfilled with clean soil and regraded.

An estimated 2,000 CY of mixed debris and soil will also be remediated. Of this, 600 CY of debris is believed to overlie the buried concrete slab and are saturated with LNAPL. This saturated debris will be excavated and disposed in a TSCA landfill due to the potential that it contains PCBs. The remaining 1,400 CY of soil will be disposed offsite at a TSCA or RCRA Subtitle D solid waste permitted landfill, depending on whether it contains PCBs. The slab will be removed and disposed in a RCRA Subtitle D solid waste permitted landfill. Any LNAPL-saturated soil or debris underlying the slab will be disposed in the same manner as that overlying the slab.

#### **LNAPL**

An estimated 3,000 CY of LNAPL-saturated soils, predominately in the former tank farm area and distinct from soils in the former tank farm area exceeding soil performance standards but not saturated with LNAPLs (Figure 6.1.2.2 depicts the areal extent

of the LNAPL), will be excavated and disposed off-site at a TSCA, or RCRA permitted Subtitle C or Subtitle D facility, as required by the level of contamination in those soils. LNAPL from this and any other excavation where it is encountered in a thickness at or exceeding 0.02 feet will be recovered and sent off-site for incineration. It is the goal of this design to capture and/or recover 100 percent of the LNAPL, however, it should be noted that when the thickness of the LNAPL is less than 0.02 ft or the ability to perform direct excavation cannot be done without demolition to the existing infrastructure or buildings then recovery will not occur. LNAPL removal is intended to remove the source of ground water contamination.

These LNAPL-saturated soils underlie approximately 19,000 CY of oil. The RI/FS data show the 19,000 CY of soil to within the risk range of  $10^{-4}$  to  $10^{-6}$  to the industrial worker. This overburden shall be excavated and stockpiled during the direct excavation of the 3,000 CY of LNAPL-saturated soils. The stockpiles shall be sampled to ensure that soils exceeding the hot spot performance standards are disposed at an off-site permitted landfill. A sampling plan will be developed during remedial design.

### **Ground Water**

The ground water performance standards as described below in Section 10.1.2, shall be achieved within the ground water through intrinsic remediation/attenuation which is a combination of biodegradation, dispersion, dilution, and adsorption. Intrinsic remediation/attenuation is expected to effectively reduce contaminants in the ground water to concentrations protective of human health (i. e., ground water performance standards) in a timeframe comparable to that which could be achieved through active restoration. The active restoration timeframes for ground water treatment components for this site have been estimated not to exceed 10 years.

Determining the existence and effectiveness of the biodegradation component of intrinsic remediation/attenuation is a necessary part of this remedy. Presently, it is believed by the PRPs that the plume is being degraded via intrinsic remediation at a higher rate than the flow of ground water, thereby containing contaminants on the site. Existing data will be reviewed and additional data will be collected during the implementation of this remedy to verify that intrinsic remediation is containing and degrading contaminants within the ground water plume. The scope of the additional data collection is described in Section 10.1.1.

### **Previously Generated Removal/Remedial waste**

All wastes associated with the Emergency Surface Removal Action



(ESRA) and the remedial investigation shall be removed for off-site disposal or treatment in the local POTW, respectively. The ESRA waste shall be disposed, as appropriate, in a permitted RCRA hazardous waste landfill.

### **Performance and Compliance Monitoring**

A performance and compliance monitoring program shall be developed for both the soils (to include buried debris) and ground water (to include LNAPL) media to determine the effectiveness and completeness of the removal and containment components of the remedy, and the effectiveness of intrinsic remediation/attenuation of the ground water.

A soil sampling performance plan shall be developed to confirm that the excavations outside the former tank farm area encompass the extent of soils exceeding the soil performance standards; to monitor and mitigate contaminant releases during excavation of soils and buried debris; to ensure that the soils contained under the 42-inch clean soil cover do not exceed the soil hot spot performance standards; to confirm that the recoverable LNAPL has been recovered; to confirm that LNAPL-saturated soils has been excavated for offsite disposal; and to determine the appropriate off-site disposal destination (i.e., incinerator, TSCA, RCRA Subtitle C or Subtitle D permitted landfills) of all waste leaving the site. A soil compliance monitoring plan shall be developed to ensure the effectiveness and integrity of the 42-inch clean soil cover.

A ground water monitoring plan shall be developed to fully characterize the extent and nature of the existing offsite contaminant migration including further delineation of the compliance boundary; to ensure that the current extent of the contaminated ground water plume does not further migrate; and to determine the impacts of the off-site TCA plume upon the remediation of the onsite contaminated ground water.

The compliance boundary shall be established during the remediation of the ground water to ensure that the contaminants within the ground water do not migrate at concentrations above the ground water performance standards beyond this boundary. Its purpose is to ensure protection of the ground water outside the area of contamination. The compliance boundary is a physical boundary that is delineated as the present extent of migration of the site contaminants at concentrations defined by the ground water performance standards (see Figure 6.1.3.2). The precise location of the compliance boundary shall be delineated during remedial design.

Notwithstanding the establishment of the compliance boundary during the remedial design, the selected remedy of intrinsic bioremediation must meet the ground water performance standards

throughout the contaminant plume within the time frame set forth above.

The Region VIII Superfund performance monitoring guidance for ground water remedies shall be used to develop the ground water monitoring plan.

The frequency, locations, constituents, sampling methods, detection limits, analytical methods, etc. and explicit details the soil and ground water monitoring plans for performance and compliance, and for long-term ground water monitoring will be determined during Remedial Design (RD).

### **Institutional Controls**

Institutional controls are nonengineering methods for preventing or limiting access to or use of a site. Such controls shall be implemented as part of the selected remedy to ensure the effectiveness and protectiveness of the remedy and to prevent or prohibit all activities that would in any way reduce or impair the effectiveness and protectiveness of the remedy. All measures shall be effectively administered, maintained and enforced.

Institutional controls including a fence, warning signs, and access "use" restrictions shall be installed and administered during and after the implementation of the soils (to include buried debris) and LNAPL remedy. Access and land use restrictions, to ensure no future activity takes place at the Site that is incompatible or inconsistent with the selected remedy, shall be established that will rum with the land. Water use restrictions shall include coordination with the Utah Department of Environmental Quality and the Utah State Engineer to restrict water usage and prohibit well drilling on the site and in the vicinity of the plum, with the exception of wells needed for remedial purposes, during the remediation of the contaminated ground water. The person who performs the function of the Utah State Engineer is either the Regional and/or State Engineer with the Division of Water Rights, within the Utah Department of Natural Resources.

#### **10.1.1 Additional Data Collection**

Additional data collection is required as part of the intrinsic remediation remedy to demonstrate quantitatively that vinyl chloride is degrading to the less toxic constituents of ethane and ethane. ESRC agreed to collect qualitative data to determine whether ethane and ethene can be detected in the field and initiated collection of this data in November 1995. Additional methods shall be developed to detect the low levels of ethane and ethene. If the results of this data collection render detections of ethane and ethene, further studies shall be initiated as part of the selection of intrinsic remediation as a remedy to quantify

the rate of degradation of vinyl chloride to ethane and ethene.

An approach to quantify the degradation of vinyl chloride to ethane and ethene through the use of a tracer test has been developed. The tracer test shall involve the following steps:

(1) Develop a 3-D picture of contaminant distribution necessary to achieve the design and implementation of a tracer test. The purpose is to determine if there are layers of high vinyl chloride concentration and to more accurately determine the depth at which VC resides, especially in relation to the geothermal water. This includes sampling at multiple depths within the aquifer, using an ultra-low flow sampling pump, to sample discrete aquifer intervals, coupled with downhole flow meter measurements. This discrete sampling approach and flow monitoring at various depths within the well are designed to define if there are zones or intervals of varying flow rate and contaminant distribution. The sampling method will minimize any vertical flow in the borehole. The sampling and flow monitoring will be done for a subset of existing wells. A number of five wells are believed to be sufficient, however, the quality of the data as defined by EPA will determine whether this number is adequate.

(2) Perform a tracer test. The purpose of the test is to monitor the behavior of vinyl chloride relative to a conservative tracer such as bromide. The test will be done using a tight horizontal and vertical grid or array of temporary Geoprobe points so that the exact flow direction and degree of dispersion/mixing that are occurring in the area of the plume can be defined. A conservative tracer will be injected up gradient using an existing well. The tracer test results will then be used to normalize the vinyl chloride data, so that vinyl chloride breakdown can be accurately tracked.

The above paragraphs describe an approach that was derived during discussions with the Ekotek Site Remediation Committee (ESRC). The Responsible Party(s) performing the remedial design may develop a comparable approach with the objective to quantify the degradation of vinyl chloride to ethane and ethene. The comparable approach shall be fully described by the Responsible Party(s) in a work plan to be approved by EPA during remedial design.

#### **10.1.2 Performance Standards and Compliance Boundary During Remediation**

The selected remedy for soils (to include buried debris) and ground water (to include LNAPL) shall fully comply with,

achieves, and maintain the performance standards described in this subsection. A listing of the performance standards for the selected remedy is located in Table 10.1.2. The soil hot spot performance standards are defined below.

#### **10.1.2.1 Soil Hot Spot Performance Standards**

The soil hot spot performance standards are a combination of PRGs and ARARs and are provided below:

- Benzo(a)anthracene - 780 mg/kg;
- Benzo(a)pyrene - 78 mg/kg;
- Benzo(b)fluoranthene - 780 mg/kg;
- Dibenz(a,h)anthracene - 78 mg/kg;
- Indeno(1,2,3-c,d)pyrene - 780 mg/kg;
- PCBs - 10 mg/kg;
- 2,3,7,8-TCDD(TEF) - 0.186 ug/kg; and
- Thallium - 160 mg/kg
- Total petroleum hydrocarbon (TPH) - 100,000 mg/kg

Soil hot spot standards establish the levels of soils that must be excavated and shipped for offsite disposal to a TSCA-permitted facility, RCRA hazardous waste disposal facility or RCRA Subtitle D permitted solid waste landfill. If during the field sampling the soils are determined to be free of PCBs, it may be determined that the hot spot soils are more suitable for disposal at an off-site permitted RCRA Subtitle C hazardous waste landfill or Subtitle D solid waste landfill.

#### **10.1.2.2 Soil Performance Standards**

The soil performance standards were derived from a combination of the soil PRGs and ARARs. The soil performance standards are as follows:

- Benzo(a)anthracene - 7.8 mg/kg;
- Benzo(a)pyrene - 0.78 mg/kg;
- Benzo(b)fluoranthene - 3.4 mg/kg;
- Dibenz(a,h)anthracene - 0.78 mg/kg;
- Indeno(1,2,3-c,d)pyrene - 7.8 mg/kg;
- PCBs - 0.15 mg/kg;
- 2,3,7,8-TCDD(TEF) - 1.86E-06 mg/kg; and
- Thallium - 160 mg/kg

The soil performance standards represent the levels of protection that must be achieved through containment of the low-level contaminated soils, i.e., any soils above this, but below the Hot Spot performance standards shall be consolidated in the tank farm area under a 42-inch clean soil cap.

#### **10.1.2.3 Ground Water Performance Standards**

The ground water performance standards were derived from a combination of the ground water PRGs and ARARs. The ground water performance standards are as follows:

- benzene - 0.005 mg/l
- chloroform - 0.1 mg/l
- cis-1,2-dichloroethene - 0.07 mg/l
- vinyl chloride - 0.002 mg/l
- benzo(b)fluoranthene - 0.0002 mg/l
- antimony - 0.006 mg/l
- arsenic - 0.05 mg/l
- beryllium - 0.004 mg/l
- manganese - 0.05 mg/l
- mercury - 0.002 mg/l
- nickel - 0.1 mg/l
- silver - 0.05 mg/l
- thallium - 0.002 mg/l

The selected remedy for ground water shall meet these ground water performance standards.

#### **10.1.2.4 Compliance Boundary During Remediation**

A compliance boundary shall be established during the remediation of the ground water to ensure that the contaminants within the ground water do not migrate at concentrations above the ground water performance standards beyond this boundary. Its purpose is to ensure protection of the ground water outside of the area of contamination. The compliance boundary is delineated as the present extent of migration of the site contaminants at concentrations defined by the ground water performance standards (see Figure 6.1.3.2). The precise location of the compliance boundary shall be delineated during remedial design.

Notwithstanding the establishment of the compliance boundary during the remedial action, the selected remedy of intrinsic bioremediation shall meet the ground water performance standards throughout the contaminant plume within the time frame set forth above in Section 10.1.

A monitoring system will be developed during RD and installed as part of RA to detect migration of contaminants above the ground water performance standards beyond the compliance boundary. In the event that contaminants above the ground water performance standards are detected beyond the compliance boundary, EPA, in consultation with the State, will reevaluate the remedy and may require that the contingency measure for containment be activated.

#### **10.1.3 ARARs**

The Federal and State ARARs and TBCs for the selected remedy are

listed in Table 10.1.3. The chemical-, location-, and action-specific ARARs identified in Table 10.1.3 shall be met. Air emission standards and ARARs regarding incineration shall be met. The offsite disposal facility may require that the waste meet land disposal restrictions (LDRs); this is not anticipated to be a problem because (1) it is expected that much of the waste already meets LDRs, (2) a treatability variance could be obtained for waste that does not meet LDRs, and (3) the continuing revisions to the RCRA requirements for contaminated media may significantly alter the regulatory scheme at the time of cleanup. Excavation and off-site disposal in a permitted TSCA, hazardous or solid waste landfill of the former UST #2 soils will comply with relevant and appropriate Utah regulatory UST requirements. Some of the ARARs are discussed below.

#### **10.1.3.1 Soils (to include buried debris)**

- **Toxic Substances Control Act (40 CFR Part 761, Subpart G, PCB Spill Cleanup Policy):** Due to the leaks and spills of oil containing PCBs during the operation of the facility, the PCB Spill Policy, 40 CFR Part 761, is relevant and appropriate to the nonrestricted access of the industrial worker at the Petrochem/Ekotek site. Soil that is contaminated by PCB spills shall be decontaminated to 10 ppm PCBs by weight provided that soil is excavated to a minimum depth of 10 inches. The excavated soil shall be replaced with clean soil, i.e., containing less than 1 ppm PCBs, and the spill site shall be restored. The risk-based number of 0.15 mg/kg is more stringent and therefore is the soil performance standard for the selected remedy (see Table 10.1.2).

- **Corrective Action Management Unit - 40 CFR Part 264, Subpart S:**

The Corrective Action Management Unit (CAMU) rule has been selected as an ARAR for the selected remedy at the Petrochem, Site. As a part of this remedy, the Petrochem/Ekotek Site has been designated as a CAMU. The rule, 40 CFR § 264.552(f), requires documentation of the rationale behind the designation in accordance with several listed criteria. The following criteria apply as rationale for the designation in this action:

***(1) The CAMU shall facilitate the implementation of reliable, effective, protective, and cost-effective remedies;***

The CAMU approach shall achieve the above standard by providing for consolidation of waste materials and permanent disposal of such wastes on-site. This area of consolidation is ideally suited for handling these

activities in a cost-effective manner while providing protection to human health and the environment. The on-site repository shall also facilitate this remedial action because it provides RCRA-quality protection for the low-level contaminated wastes, whether they are RCRA Subtitle C or Subtitle D wastes, while also producing a significant cost savings over off-site disposal.

Decontamination areas, where materials and equipment from decommissioning and demolition activities shall be cleaned, allow for the efficient handling of these materials. They shall be set up to minimize, if not completely eliminate, any potential releases into the groundwater, air, and surface water.

Any temporary staging areas which may be needed during the excavation and consolidation activities shall be established within the CAMU. Measures shall be taken to minimize the possibility of releases into groundwater during storage.

The consolidation area shall, at a minimum, meet RCRA solid waste landfill standards and shall utilize proven technology to safely dispose of the contaminated soils and sludges. Its location, in an industrial area, allows for the long-term placement of wastes which will not impact residential areas or use very limited off-site RCRA storage space.

The staging and decontamination areas of the CAMU shall be closed in a manner that will eliminate any long-term threat. The repository area of the CAMU shall be constructed to meet the requirements of RCRA Subtitle D; and long-term monitoring of the groundwater and cap maintenance shall be conducted in accordance, at minimum, with RCRA standards.

***(2) Remedial waste management activities associated with the CAMU shall be protective of human health and the environment.***

The remedial activities within the CAMU will be protective of human health and the environment. The CAMU shall be located at the Site so that it will provide effective separation of the waste management activities and potential off-site human receptors. A Health and Safety Plan shall be prepared in accordance with the Occupational Health Hazardous Waste Operations to be protective of workers performing remedial activities. Treatment, management and disposal of remedial wastes within the CAM shall eliminate any

potential hazards that might be associated with off-site transport, treatment, or disposal.

***(3) The CAMU shall Include uncontaminated arms of the facility, only if including such areas for the purpose of managing remediation waste is more protective than management of such wastes at contaminated areas of the facility.***

Areas within the CAMU used for temporary staging of waste materials prior to consolidation as well as decontamination areas shall be located to maximize efficient handling of waste materials excavated pursuant to the selected remedy and to minimize impacts to uncontaminated areas. The repository area shall be located in an area that is presently contaminated.

***(4) Areas within the CAMU, where wastes remain in place after closure of the CAMU, shall be managed and contained so as to minimize future releases, to the extent practicable.***

The consolidation area utilized for permanent disposal of wastes on the site shall be capped with 42 inches of clean soil. Soil hot spots in the consolidation area shall be excavated and removed for off-site disposal prior to the consolidation of other site wastes. Long-term maintenance and monitoring of the cap are provided as part of the selected remedy.

***(5) The CAMU shall expedite the timing of remedial activity implementation, when appropriate and practicable.***

The placement of areas within the CAMU for decontamination and those for temporary staging and storage in relationship to the repository shall allow for the efficient and expedited movement, treatment and final placement of contaminated materials.

***(6) The CAMU shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU.***

Wastes in various areas on the site, as provided in the selected remedy, shall be tested prior to consolidation, with soils meeting hot spot criteria shipped for off-site disposal. Only soils within EPA's acceptable risk range as specified in the selected



remedy, shall be consolidated under the 42-inch soil cover. Studies conducted under the RI/FS indicate that there is no potential for leaching of consolidated soils to the groundwater. Soils saturated with LNAPL shall also be shipped off-site for disposal in a permitted landfill. Recoverable LNAPL shall be shipped off-site for treatment.

***(7) The CAMU shall, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure of the CAMU.***

The final size of the repository, which will contain the consolidated waste, will be significantly smaller than the current area affected by the contamination in place, including areas of off-site soil contamination. The drying of these materials will further reduce the amount of repository space needed for long-term storage. Any LNAPL-saturated soils will be shipped off-site for disposal in a permitted landfill.

- **Utah Air Conservation Act (R307-1-1):** The Utah Air Conservation Act is applicable to the quality of both fugitive and point source emissions of hazardous air pollutants (HAPs) and particulates. Air monitoring will be conducted during the soils excavation to protect workers and to ensure ambient air standards specified in Table 10.1.2 are not exceeded.

#### **10.1.3.2 Ground Water (to include LNAPL)**

- **Safe Drinking Water Act, National Primary Drinking Water Regulations (40 CFR Part 141) and Utah Safe Drinking Water Act (UCA 19-4-101):** These regulations establish health and treatment-based standards for public drinking water systems. These regulations are relevant and appropriate because the shallow ground water aquifer at the site is a potential future source of water for a public water system or private supply well.

#### **10.1.3.3 Five-Year Reviews**

- **Five-Year-Review:** As specified in Section 121(c) of CERCLA, as amended by SARA, and Section 300.430 (f) (4) (ii) of the NCP, EPA will review the remedy no less often than each 5 years after the initiation of the remedial action to assure that human health and the environment are being protected by the implemented remedy (this review will ensure that the remedy is protective and that institutional controls necessary to ensure protections are in place). An additional purpose for the review is to evaluate whether the performance standards specified in this ROD remain

protective of human health and the environment. EPA will continue the reviews until no hazardous substances, pollutants, or contaminants remain at the Petrochem/Ekotek Site above the levels that allow for unrestricted and unlimited industrial use of the land and unrestricted and unlimited residential use of the ground water.

#### **10.1.4 Contingency Measures**

Two contingency measures have been developed to ensure the protectiveness of the selected remedy.

##### **10.1.4.1 Contingency Measure for Containment**

The contingency measure for containment addresses the potential for both offsite migration of the organic plume and the ineffectiveness of the intrinsic remediation alternative. This contingency provides containment, control, and treatment of the dissolved ground water plume.

The contingencies consists of ground water extraction, water treatment of contaminated ground water (not necessary if the POTW is capable of accepting the untreated contaminated groundwater) and discharged to the POTW. This contingency includes the placement/installation of wells at and beyond (as necessary) the compliance boundary for the purposes of pumping the ground water at rates that would ensure capture of the migrating plume and pretreatment of the extracted ground water, if necessary, prior to discharge to the POW. The exact locations and number of the ground water wells shall be approved by EPA during the remedial design of the selected remedy. The treatment component includes a UV oxidation system onsite, as described in the FS for Alternative 8. Treatment standards will be dictated by the requirements of the POTW prior to discharge to the POTW.

The criterion for triggering implementation of the containment contingency is either (a) a documented, consistent and verifiable increase, as determined by EPA, in contaminant concentrations exceeding the ground water performance standards at or beyond the compliance boundary, which indicates that the remedy is not managing the waste within the current extent of the contaminated ground water plume or (b) the documented ineffectiveness, as determined by EPA, of the remedy to affect the specified reduction in contaminant mass within a time frame comparable to active remediation. The criteria will be further and more specifically developed and described in the remedial design.

The estimated cost of this contingency measure ranges from \$200,000 to \$3,000,000 for a range of operating time from 0 to 30 years. Based on available existing data, the measure would not be triggered, so the operating time is 0 years. However, to allow for the worst cast situation of persistent offsite plume

movement, the costs for a 30-year operating time have also been estimated.

#### **10.1.4.2 Contingency measure for Arsenic Remediation.**

The arsenic contingency measure consists of ground water extraction, water treatment, if necessary, and discharge to the POTW. The contingencies measure for arsenic remediation addresses the concern regarding the potential for exceedance of arsenic above its MCL of 0.05 mg/l within the plume and migration offsite.

This contingency includes the placement/installation of wells at and beyond (if necessary) the compliance boundary for purposes of pumping the ground water at rates that would ensure capture of the migrating plume and pretreatment, if necessary, prior to discharge to the POTW. The exact locations and number of the ground water wells will be approved by EPA during the remedial design of the selected remedy.

The contingency measure also applies within the plume when, as determined by EPA, the exceedances of arsenic above the MCL are demonstrated to be above natural background; the concentrations and consistency of detections of arsenic above the MCL are statistically significant; and the effectiveness and the cost of the pump and treat system justify the reduction of risk. The statistical method which shall be employed to determine statistically significant data will be developed as part of the Compliance Monitoring Program during remedial design of the remedy and shall be approved by EPA. EPA shall make the determination of background level, statistical significance of arsenic detections and whether the effectiveness and cost of pumping and treating justify the reduction of risk.

Treatment shall be conducted on all contaminated ground water that exceeds the requirements of the POTW or the ground water performance standards. Treatment for removing arsenic from ground water uses activated alumina adsorption (also known as gamma aluminum oxide, a porous adsorbent with a moderately high surface area).

Treatment will occur onsite, although based on the existing site POTW discharge permit, an arsenic treatment standard is not specified. Inclusion of the onsite treatment component as part of this contingency measure allows for treatment prior to discharge to the POTW, if such a requirement is specified in the future.

The criterion for triggering implementation of the arsenic contingency is either (a) a documented, consistent and verifiable increase in contaminant concentrations exceeding the MCL at or beyond the compliance boundary, which indicates that the remedy

is not managing the waste on the site or (b) the documented ineffectiveness of the remedy to affect the specified reduction in contaminant mass. The criteria shall be further and more specifically developed and described in the remedial design.

The estimated cost of this alternative ranges from \$300,000 to 3,600,000 for a range of operating time from 0 to 30 years. Based on site data available, the alternative would not be triggered, so the operating time is 0 years. However, to allow for the worst case situation of a statistically significant occurrence of arsenic above the MCL, costs for the 30-year operating time have also been estimated.

## **10.2 Cost of the Selected Remedy**

A detailed cost table (Table 10.2) has been developed for the selected remedy and is organized by capital costs, O&M costs and long-term O&M costs. Within each of these cost groups, the remedy is divided into soils, buried debris, LNAPL and ground water. The unit costs provided in these tables are based on a compilation of vendor contacts, EPA documents, contractor information, and technical references. Each unit cost and quantity has a corresponding reference designated as unit cost (UC) or quantity (Q). Each reference refers to a file of backup information, including calculation sheets, vendor quotes, and lists of assumptions used to develop the unit costs and quantities. The files of backup information are located in the FS.

Also included are costs for the two contingency measures (arsenic treatment and containment) (Tables 10.2A and 10.2B).

The indirect costs have been calculated by applying factors to the direct costs identified in each of the tables. A discussion of how these indirect cost factors were developed and what the indirect costs include is provided in this subsection.

### **10.2.1 Indirect Cost Factors**

Indirect costs are applied to the sum of the three main cost groups which include direct capital costs, direct O&M costs, and direct long-term O&M activity costs. The indirect costs include: mobilization/demobilization; indirect, overhead, and profit; engineering design; and contingencies. The indirect costs vary to contamination, technologies selected, size of the project, and duration. Based on the characteristics of each alternative, these factors assist in the development of indirect percentages as explained below. These indirect percentages are then applied to the direct costs to determine an overall total cost.

In order to provide a uniform basis of an estimate, a cost markup matrix was developed based on the consideration factors to

determine indirect cost percentages for direct capital and O&M costs. The selected remedy has been individually adjusted to be more representative of its own complexity. The following subsections explain the indirect markup factors and the application rationale.

#### **10.2.1.1 Mobilization/Demobilization**

Mobilization activities include construction/setup of contractors' support facilities, mobilization of heavy equipment, and relocation of management/supervisory personnel. Demobilization consists of decontamination and removal of contractors, equipment and facilities from the site. Costs for these activities are applied as a percentage of direct cost. These percentages applied can vary from 2 to 7 percent.

#### **10.2.1.2 Indirects, Overhead, and Profit**

Indirect costs are calculated as a percentage of the sum of direct and mobilization/demobilization costs. Indirect costs cover the cost of onsite management, administrative, technical, health and safety, and supervisory staff, utilities for site support facilities (excluding production facilities), engineering tests, QA/QC program, preparation of work plans, submittals and as-built drawings, bonding costs, support facilities, and vehicle maintenance and operation. The range of percentages applied can vary from 20 to 35 percent. The selected remedy uses 30 percent.

#### **10.2.1.3 Engineering Design**

The engineering design costs are estimated as a percentage of the sum of direct costs; mobilization/demobilization costs; and indirects, overhead, and profit cost. In general, engineering percentages were developed based on past experience of engineering costs on similar projects. These percentages are dependent upon the degree of complexity associated with the particular alternative and the complexity of the treatment technology selected. Standard percentages ranging between 3 and 6.5 percent have been applied to the estimates. The selected remedy uses 2 percent for the capital costs of the soils and 3 percent for the buried debris remediation; and 2 percent for the capital costs of the LNAPL and ground water remediation.

#### **10.2.1.4 Contingency**

A contingency is applied as a percentage of the sum of direct cost; mobilization/demobilization; indirects, overhead, and profits; engineering design; and engineering costs. Contingencies cover the specific provisions for unforeseeable elements of costs within the defined project scope. A contingency is particularly important when previous experience relating estimated and actual costs have shown those inferable

events which will increase costs are likely to occur. To effectively compare the design alternative, contingency has been applied to each alternative estimated based on the complexity of the treatment technology, unforeseen and unpredictable conditions, and/or uncertainties within the scope of this project. Other considerations which may affect the selection of the contingency are levels of contamination, environmental media and climatic conditions, scheduling, changes in federal, state, or local regulation, and other issues unique to the project such as management permits and regulatory reviews.

Separate contingencies were developed for capital, O&M, and long-term activities. A contingency range for this level of detail is typically 20 to 50 percent. The contingency to be provided for the current estimates were developed based on four cost parameters considered for each cost type, including levels of contamination, the complexity of the treatment technology, the size of the project, and estimated duration of the activity. The amount of contingencies applied to the estimates ranged from 25 to 40 percent based on these consideration factors and on past experience and knowledge with similar remedial projects. The selected remedy uses 20 percent for the capital costs of the soils, 30 percent for the capital costs of the buried debris and LNAPL remediation; 20 percent for the capital costs of the ground water remediation; 30 percent for the O&M costs of the soils, buried debris and LNAPL remediation; and 20 percent for the O&M costs of the ground water remediation.

Section 11.0  
Documentation of Significant Changes

## **Section 11.0**

### **Documentation of significant Changes**

To fulfill the requirements of CERCLA section 117(b), this section discusses the reasons for the selection of a remedy other than the preferred remedy in the Proposed Plan, changes to the monitoring program and changes in the removal of the onsite sludge derived from the Emergency Surface Removal.

#### **11.1 Selection of New Remedy**

The Proposed Plan was released on July 6, 1995 to the public presented alternative 7 as EPA's preferred alternative. The central differences between alternative 7 and alternative 10, the selected remedy, are the soil and ground water components of the remedies. Alternative 10 relies upon containment of the low-level contaminated soils under a 42-inch soil cap and intrinsic remediation/attenuation of the ground water to achieve ground water performance standards. Alternative 7 thermally desorbs these low-level contaminated soils and relies upon a pump and treat system to capture the ground water contaminants for treatment at the local POTW.

##### **11.1.1 Soil Component**

Based upon the public comment received and as part of EPA's internal deliberation process, EPA revisited the requirements for treatment of the soils.

The result of the Baseline Risk Assessment for the Site shows that the accumulative reasonable maximum exposure (RME) risks from carcinogenic and noncarcinogenic chemicals of concern within the soils for exposure to the industrial worker is  $9.75 \times 10^{-5}$  and HI of less than one, respectively. The Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions (OSWER Directive 9355.0-30) states that where the cumulative carcinogenic site risk to an individual based on the reasonable maximum exposure for both current and future land use is less than  $10^{-4}$ , and the noncarcinogenic hazard quotient is less than one, action generally is not warranted unless there are adverse environmental impacts. During the investigations at the site, EPA did not identify an environmental impact. The directive also states that a risk manager may also decide that a baseline risk level less than  $10^{-4}$  is unacceptable due to site specific reasons and that remedial action is warranted. EPA believes that action is warranted with respect to the soils, due to the uncertainties of the risk assessment (see 7.1.5), potential for exposure to discrete areas where soil exposure exceeds  $10^{-4}$  and the risk being so close to the upper bound of the acceptable risk range. But EPA believes that the action's cost should be proportionate the level of protectiveness required.



Upon review of A Guide to Principal Threat and Low Level Threat Wastes (Superfund Publication: 9380.3-06FS), EPA has determined that the contaminants within the soils represent a low-level threat waste. Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of release. They include source materials that exhibit low toxicity, low mobility in the environment, or are near health-based levels. The soils at the Petrochem site exhibit low toxicity and mobility and are near health-based levels.

EPA also reviewed the NCP language, Interim Final Guidance on Preparing Superfund Decision Documents (EPA/624/1-87/90) and A Guide to Selection Superfund Remedial Actions (OSWER Directive 9355.0-27FS) pertaining to low-level threat wastes. The NCP and guidance expects EPA to use engineering controls, such as containment, for waste that poses a relatively low long-term threat.

CERCLA Section 121 expects EPA to select cost-effective remedies. Alternative 6 has the same remedy components for the ground water and LNAPL as does alternative 10 but they have different soil remedy components. Alternative 6 thermally desorbs the soils at a total remedy cost of \$14.2 million and alternative 10 contains the low-level contaminated soils under a 42 inch clean soil cover at a total remedy cost of \$6.1 million.

EPA believes that the offsite disposal of wastes that exceed the  $10^{-4}$  risk and the containment onsite of the remaining low-level contaminated soils as specified in the selected remedy meets the cost-effectiveness requirements of CERCLA and the expectations of the NCP and EPA guidances.

#### **11.1.2 Ground Water Component**

Shortly before the release of the Proposed Plan, ESRC submitted to EPA an Aquifer Characterization Report that discussed new information regarding the contamination at and near the site and the hydrogeology of the site. The Aquifer Characterization Report was referenced in the Proposed Plan. The information of the report was not incorporated into the Proposed Plan because EPA decided it was best not to delay the release of the Proposed Plan and additionally, to provide the document for public review. EPA and UDEQ hosted a technical meeting with ESRC, County government representatives, and public citizens during the public comment period on August 28 and 29, 1995 at the offices of UDEQ to discuss the ground water components of the alternatives as they relate to the new information. During this meeting, numerous concerns were aired regarding the ground water treatment components of pump and treat systems vs. intrinsic remediation/attenuation. Many of the concerns regarding the pump and treat components of alternative 7 were submitted as public

comments (see Responsiveness Summary). The concerns include: "pumping will cause up coning of the geothermal water," "commingling of geothermal water with contaminated water will increase total pumping and treatment costs," "pumping may draw additional offsite contaminants onsite," and "pump and treat may disrupt current site conditions which may support bioremediation." The concerns regarding intrinsic remediation/attenuation were focussed on whether bioremediation was actually occurring at the Petrochem/Ekotech site and if so, how to gather data to evaluate the degradation rate. Although all parties agreed that the conditions appeared generally favorable for bioremediation, much of the evidence necessary to demonstrate bioremediation, such as vinyl chloride degrading to ethene and ethane, was absent.

The information provided in the Aquifer Characterization Report has lead EPA to support the selection of intrinsic bioremediation/natural attenuation over a pump and treat system. However, it should be noted that the containment contingency (which is a pump and treat system) will be relied upon for containment should intrinsic bioremediation/natural attenuation fail to contain the contaminants within the groundwater plume beneath the site within the boundaries of the compliance boundary.

In addition to the effectiveness of the ground water remedies, the Aquifer Characterization Report discusses the information of 1,1,1-trichloroethane (TCA) detections offsite. For further discussion of this TCA, see section 11.1.4.

#### **11.1.3 Study for Quantification of Bioremediation of Vinyl Chloride**

The selected remedy of intrinsic remediation/attenuation, includes a study for quantification of bioremediation of vinyl chloride. That is, a study will be performed as part of RD that will determine whether vinyl chloride is degrading to ethene and ethane, and if so, at what rate, and whether that rate is sufficient to achieve the ground water performance standards within a comparable timeframe of active treatment systems.

##### **11.1.3.1 Previously Collected Data**

ESCR initiated the collection of qualitative data to determine whether ethane and ethene can be detected in the field in November 1995. If the results of this data collection render detections of ethane and ethene, further studies shall be initiated as part of the intrinsic remediation remedy to quantify the rate of degradation of vinyl chloride to ethane and ethene.

##### **11.1.3.2 Data to be Collected during Remedial Design and Remedial Action**

Additional data collection is required as part of the intrinsic remediation remedy to demonstrate quantitatively that vinyl chloride is degrading to the less toxic constituents of ethane and ethene.

Section 10.1.3.2 describes the type of data needed to quantify the degradation rate of vinyl chloride to ethane and ethene, and how the studies will be implemented through an EPA approved work plan during RD.

If biodegradation of the vinyl chloride to ethane and ethene cannot be quantified, or if the rates are inadequate to meet the criteria specified in this ROD, as determined by EPA, then the selection of intrinsic remediation as a remediation of the ground water for the Petrochem/Ekotech site will be reevaluated by EPA and modifications to the primary remedy or initiation of contingency measures may be deemed necessary to be protective of human health and the environment.

#### **11.1.4 Enhanced Ground Water Monitoring**

The Aquifer Characterization Report shows detections as high as 788 ppb of TCA during the spring of 1995, at piezometers located offsite. The detections of TCA onsite were detected during the early phases of the investigation and were an order of magnitude less than the detections of TCA found offsite. Between February 1993 and February 1995, there has been only one onsite detection of TCA at MW-7 at a single digit ppb concentration. The wells to the north and east of the site (e.g., W-9, MW-3, W-4a, W-10) have shown detections of TCA ranging from single digit concentrations to 227 ppb since November 1994. EPA currently believes that the TCA plume offsite is from an off-site source not related to the Petrochem/Ekotech site. However, EPA believes that further information is needed before definite conclusions can be drawn. It is not known at this time whether the offsite TCA plume is migrating onsite. Therefore, EPA has included an enhanced ground water monitoring program located on the northern and northeastern part of the site that will determine the impact of the offsite TCA plume to the onsite ground water remedy.

The frequency, locations, analytes, sampling methods, detection limits, analytical methods, QA/QC, etc. and explicit details of the monitoring plans for performance and compliance, and for long-term ground water monitoring will be determined during Remedial Design (RD). The Region VIII Superfund performance monitoring guidance for ground water remedies will be used to develop the ground water monitoring plan.

#### **11.1.5 Additional Sampling of LNAPL**

ESRC submitted data to EPA in October 1995 that was a compilation

of all the data collected at the site since the release of the Feasibility Study in January 1995 to August 1995. Most of the data was collected to gain a better understanding of the site and was used to develop the Aquifer Characterization Report.

ESRC collected another LNAPL sample in March 1995 and modified the analytical methods to achieve lower detection limits. Halogenated volatile constituents were analyzed by purge and trap concentration (EPA Method 5030) combined with gas chromatography (GC) as described in EPA Method 8010. The LNAPL was analyzed specifically for vinyl chloride, 1,1,1-trichloroethane and tetrachloroethylene by mass spectrometry using selective ion monitoring (SIM). Vinyl chloride was detected at 480 ppb; 1,1,1-trichloroethane (TCA) was detected at 130 ppb; and tetrachloroethylene (PCE) was detected at 410 ppb. All previous data collected from the LNAPL had detection limits of 10,000 ppb or greater and therefore vinyl chloride, TCA or PCE was not detected.

Vinyl chloride, TCA, and PCE detected in the LNAPL were evaluated and the likelihood that they would dissolve from the oil. Table 6.1.2.3 shows the results of the partitioning exercise. The predicted concentrations show that the maximum concentrations of vinyl chloride, TCA and PCE have the potential to partition into the ground water at concentrations of 110 ppb, 0.55 ppb and 1.2 ppb, respectively. When the predicted concentrations in water are compared to the actual concentrations in water, it is clear that most compounds present in the LNAPL are not observed in ground water due to their affinity for the residual organic phase. However, this partitioning exercise clearly demonstrates that the LNAPL is a likely source material of the vinyl chloride in the ground water. A source material is defined as material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to ground water or acts as a source for direct exposure. Because of the concentrations of the solvents within the LNAPL, the potential of the LNAPL to partition to the ground water, and the significant risk to human health or the environment should exposure occur, the plume and saturated soils above the plume are considered principal threat wastes.

**Section 12.0**  
**Statutory Determinations**

## **Section 12.0**

### **Statutory Determinations**

EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, CERCLA § 121 establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for a site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatments that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances as their principal element. The following discussion addresses how the selected remedy meets these statutory requirements.

#### **12.1 Protection of Human Health and the Environment**

*EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (1988) indicates that protectiveness may be achieved by reducing exposure through actions such as containment, limiting access, or providing an alternative water supply. The remedial actions described for the selected remedy will permanently address the principal threat posed by the LNAPL to human health and the environment through offsite incineration and reduce the toxicity, mobility, and volume through bioremediation\natural attenuation of the ground water.

Short-term and cross-media impacts due to implementation of the selected remedy are expected to be minimal. Potential risks to human health and environment through exposure to contaminated groundwater and soil during well installation and sampling will be minimized by the use of appropriate preventive and protective measures. Potential cross media impacts will be minimized by proper well construction methods.

##### **12.1.1 Soils (to include buried debris)**

The soils pose a risk to the future industrial worker at the site. The reasonable maximum exposure (RME) of the future industrial worker from surface soil ingestion and dermal contact with the soils has been estimated to be  $9.75 \times 10^{-5}$ . The offsite disposal of soils exceeding the not spot criteria, and consolidation of low level soils onsite under a 42-inch clean soil cap will effectively eliminate exposure and thus any

associated risk to the contaminants.

#### **12.1.2 LNAPL**

Risk was not quantified from any of the contaminants within the LNAPL because the exposure pathway was not complete. Samples of the LNAPL taken in March 1995 show that the LNAPL has high concentrations of contaminants. Vinyl chloride was detected at 480 ppb; 1,1,1-trichloroethane was detected at 130 ppb; and tetrachloroethylene was detected at 410 ppb. The partitioning exercise described above in this ROD clearly demonstrates that the LNAPL is a likely source material of the vinyl chloride in the ground water. The LNAPL is believed to be the likely source of contamination to the ground water and therefore is considered a principal threat waste.

The selected remedy removes virtually 100% of the LNAPL from the site for offsite incineration and disposes the 3,000 CY of LNAPL-saturated soils offsite in a TSCA-permitted landfill. This remedy completely and permanently removes the principal threat waste from the Petrochem/Ekotek site.

#### **12.1.3 Ground Water**

Contaminated groundwater at the Site does not currently pose a significant human health risk because the groundwater is not presently being used for drinking water or other domestic uses. Thus, there are no completed exposure pathways.

A potential future risk may occur if a resident does use the ground water for domestic purposes. The reasonable maximum exposure (RME) of the future resident drinking the ground water and showering in the ground water is  $7.99 \times 10^{-4}$ . The intrinsic remediation/attenuation of the ground water reduces this risk to within acceptable levels. Groundwater monitoring will allow for evaluating the performance of the selected remedy and the need for additional action.

### **12.2 Compliance with ARARs**

Under Section 121(d) (1) of CERCLA, remedial actions must attain standards, requirements, limitations, or criteria that are "applicable or relevant and appropriate" under the circumstances of the release at the site. All ARARs would be met upon completion of the selected remedy at the Petrochem/Ekotek site.

The selected remedy of excavation, offsite disposal, consolidation and capping onsite of the soils and buried debris; direct excavation of the LNAPL; intrinsic remediation/attenuation of the ground water and institutional controls used during implementation will comply with all Federal and State applicable or relevant and appropriate chemical-, action-, and location-

specific requirements (ARARs). Federal and State statutes and regulations pertinent to the selected remedy are discussed in Section 10.0.

### **12.3 Cost Effectiveness**

Section 300.430(f) (1) (ii) (D) of the NCP requires that the elected remedial action meet the threshold criteria of protection of human health and the environment and compliance with the ARARs, and be cost-effective. Cost-effectiveness is determined by evaluating the following three of the five balancing criteria to determine overall effectiveness: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy is cost-effective if its costs are proportional to its overall effectiveness.

#### **12.3.1 Overall Effectiveness**

The selected remedy was ranked as having a high degree of long-term effectiveness and permanence, a moderate degree of reduction of toxicity, mobility or volume through treatment, and a high degree of short-term effectiveness.

#### **12.3.2 Overall Effectiveness Compared to Cost**

The present worth cost (PWC) of the selected remedy is \$6,100,000. Alternatives 6 and 7 PWC are \$14,200,000 and 16,600,000, respectively. The cost of these alternatives is a factor of 2.3 - 2.7 times higher than the selected remedy. Because the selected remedy provides the same level of long-term effectiveness and a greater degree of short-term effectiveness at a considerable cost savings than alternatives 6 and 7, EPA believes that the selected remedy offers the best overall cost effectiveness.

### **12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable**

Section 300.430 (f) (1) (ii) (E) of the NCP requires that the selected remedy shall utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This requirement shall be fulfilled by selecting the remedy that satisfies the threshold criteria and the balancing criteria and provides the best balance of tradeoffs among alternatives in terms of the five balancing criteria. The balancing shall emphasize long-term effectiveness and reduction of toxicity, mobility, or volume through treatment. The balancing shall also consider the preference for treatment as a principal element and the bias against off-site land disposal of



untreated waste. In making the selection, the modifying criteria of state acceptance and community acceptance shall also be considered.

#### **12.4.1 Balancing Criteria**

EPA has determined that the selected remedy has a high degree of long-term effectiveness and permanence, and a moderate degree of reduction of toxicity, mobility or volume through treatment thereby partially satisfying the two criteria. The selected remedy fully satisfies the long-term effectiveness criteria and partially satisfies the preference for treatment by treating the LNAPL in an offtsite incinerator. The selected remedy does not treat the remaining soils because they are considered low-level contaminated wastes and do not warrant treatment at a cost of 2.3 times the selected remedy cost.

#### **12.4.2 Modifying Criteria**

The State of Utah supports the selection of alternative 7; however, EPA received numerous comments pertaining to the difficulty of pumping and treating within the shallow aquifer at the Petrochem/Ekotek site. The public comments question whether the shallow aquifer can be effectively and efficiently contained and captured. The high hydraulic conductivity, low contamination, and shallow geothermal waters add to the complexity and difficulty of designing an effective pump and treat system. EPA has reviewed this information and agrees, based on present information and subject to the demonstration of effectiveness of intrinsic remediation/attenuation, and given the complexity of and potential disadvantages of pump and treat systems (as described in alternative 7) that intrinsic remediation/attenuation represents the best alternative.

EPA also received numerous public comments in support of alternatives 6 and 10. These commenters believe that alternatives 6 and 10 offers the best balance of the selection criteria.

### **12.5 Preference for Treatment an a Principal Element**

The selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable at the Site. The selected remedy includes: treatment of the LNAPL and intrinsic remediation/attenuation of the ground water. Removal of the recoverable LNAPL will permanently eliminate a potential source of groundwater contamination at the Site. Intrinsic remediation/attenuation of the ground water will reduce the risk to a future resident to within EPA's acceptable risk range. Therefore the statutory preference that remedies employ treatment as a principal element is satisfied, in part, by the selected remedy.

The groundwater monitoring program will allow for evaluation of changes in groundwater quality, the detection of any offsite migration of contaminated groundwater, and the need for further action at the Site.

Because the selected remedy will result in hazardous substances remaining on the site, a review will be conducted at least every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

#### **12.6 EPA's Selection of the Remedy**

Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA believes that the selected remedy provides the best balance in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; and cost. The NCP states that EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat, and that the selected remedy shall be cost-effective. The containment of the soils onsite satisfies the NCP expectation. The containment of low-level contaminated waste, cost-effectiveness and receipt of public comment supporting alternative 10 were important criterion in selecting alternative 10 as the selected remedy.

Section 13.0  
Responsiveness Summary

Section 13.0  
Responsiveness Summary

13.1 Public Meeting Transcript

PETROCHEM/EKOTEK PUBLIC MEETING  
7:00 P.M.  
JULY 26, 1995

168 North 1950 West  
Salt Lake City, Utah



**REPORTING SERVICES, LLC**  
525 FIRST INTERSTATE PLAZA  
170 SOUTH MAIN STREET  
SALT LAKE CITY, UTAH 84101  
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Public Comments	35

1 July 26, 1995

7:00 p.m.

2  
3 PROCEEDINGS  
4

5 MS. NANCY MUELLER: Let's go ahead and get  
6 started. My name is Nancy Mueller. I'm the  
7 community relations coordinator for EPA out of the  
8 Denver office. And I'd like to take this opportunity  
9 to welcome you to this public meeting tonight for the  
10 Petrochem/Ekotek site. It's taken a while to get to  
11 this point. We're glad to be here and glad to have  
12 you here to give us the comments on the remedy that  
13 EPA and UDEQ have identified as what they think is  
14 the best approach to dealing with the contamination  
15 out of the site. Real briefly this evening, we're  
16 going to go through a few things, and then we'll get  
17 to the most important part of the meeting, which is  
18 obviously to hear what you all have to say regarding  
19 what the preferred alternative that's been identified  
20 is.

21 First of all, though, I'd like to  
22 introduce the players in this little drama. First is  
23 Dan Ford, EPA project manager. Up at the other --  
24 I'm sorry. Dan Ford. Dan Thornton. Wrong side.  
25 Now I'm done. No more. Over in the corner is J.D.

MARY D. QUINN CSR, RPR  
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1 Keetley, UDEQ project manager for the site. Front  
2 row on the end is Jim Stearns, EPA attorney for the  
3 site. Next to Jim is Barry Levene. He's Dan's  
4 supervisor out of EPA in Denver. Next to him is  
5 Scott Everett, UDEQ toxicologist. Behind Jim is  
6 Laura Lockhart for the Utah AG's office. And where's  
7 Brent? Brent Everett, UDEQ, J.D.'s section chief.  
8 At the back is Renette Anderson, UDEQ community  
9 relations.

10 This is one of the few meetings that  
11 I've been to where you outnumber us. Usually it's  
12 the other way around. We have casts of thousands to  
13 these meetings and often are disappointed because we  
14 don't get a good turnout. We appreciate this  
15 tonight.

16 What we're going to be doing tonight is  
17 giving you a little bit of presentation on what's  
18 gone on at the site regarding the site studies and  
19 findings of risk. We're going to go over the cleanup  
20 alternatives and explain to you why the alternative  
21 that we have identified right now is the preferred  
22 one. And Dan will go into that in some detail.  
23 He'll briefly discuss the project schedule as we see  
24 it now. And then the most important thing, as I  
25 said, we'll open it up for public comment, and we'll



1 let you have your say. So with that, I'm going to  
2 turn it over to Mr. Thornton. Mr. Keetley, I'm  
3 sorry. And we'll get the show on the road, and I'm  
4 going to sit down.

5 MR. J.D. KEETLEY: I'm going to run you  
6 through a bit of the site history for about the last  
7 40, 50 years. I'll try to do it real brief.

8 The Petrochem/Ekotek site is located in  
9 northern Salt Lake City at 1628 North Chicago Street.  
10 It's a seven acre site surrounded by industrial --

11 UNIDENTIFIED: Can you speak louder?

12 MR. J.D. KEETLEY: It's a seven acre site  
13 surrounded by commercial and industrial properties  
14 with a small residential area of about 40 or 50 homes  
15 is directly to the south of the site down in this area.  
16 This is the Petrochem site here in northern Salt Lake  
17 City. Next slide, please.

18 It began operation in the 1940's as an  
19 oil refinery. This is a picture of it in those days.  
20 Next slide also.

21 This is a closeup showing some of the  
22 tanks and things used during the refinery stage.

23 UNIDENTIFIED: So far, we haven't heard a  
24 damn word you've said.

25 MR. J.D. KEETLEY: I'll try to speak

1        louder. Next slide.

2                In 1978, it became the Ekotek property.  
3        And at that point, it started dealing with used oil  
4        and solvents. And basically what it did, it recycled  
5        the used oil to be resold as oil, and the solvents,  
6        it disposed of them offsite.

7                In 1981, it became owned by Steven Self  
8        and Steven Miller. And at this point, they also  
9        started adding hazardous waste to their treatment.  
10       They would treat and dispose of hazardous waste in  
11       addition to the used oil and solvent recycling.

12               This is a picture of an aerial photo of  
13       the Ekotek site in 1979, Just about at the peak of  
14       its operation. You can see some of the buildings  
15       that are still there now are the main warehouse, this  
16       warehouse back here, a warehouse down here, the tank  
17       farm area. All the tanks. And the recycling.  
18       facilities which is in here have been removed since  
19       then. Some of the dark areas showing some staining  
20       due to contamination and sludge.

21               Next slide. Can you hear me now?

22               UNIDENTIFIED: A little better.

23               Mr. J.D. KEETLEY: This is a run through, a  
24       brief history, of the site history since 1980. In  
25       1980, they applied for a RCRA, which is basically

1 just a permit to handle solid and hazardous waste.  
2 They got a part A permit. In July '87, they applied  
3 for and received a solid waste handling permit for  
4 two of their 60 tanks. If you remember back on that  
5 previous slide, or you can look over here, there are  
6 over 60 above ground vertical tanks that show up as  
7 little circles an here. They applied for and got  
8 permits for two of those tanks in July '87.

9 In November '87, Ekotek went out of  
10 business, leased the property to Petrochem. Hence  
11 the name Petrochem. Usually it's referred to as  
12 Ekotek. That was the primary owner during these  
13 years.

14 Then in December '87, Petrochem received  
15 is a violation notice from the State, what is now the  
16 Division of Air Quality, within the same Department  
17 of Environmental Quality. They received one notice  
18 of violation. They were out of compliance. They  
19 were emitting air pollutants which they should not  
20 have been.

21 January they received a second notice of  
22 violation. February of '88 they received another  
23 violation from the solid and hazardous waste people  
24 for improper and illegal handling practices of their  
25 hazardous waste. February '88, Petrochem goes out of

1 business.

2 During this time, it's important to  
3 remember this whole thing happened in a background of  
4 public complaints. The public had called the Salt  
5 Lake City County Health Department and lodged a few  
6 complaints that there had been noxious odors emitting  
7 from the sites, smoke coming off the site, and  
8 occasionally some liquids had been oozing from the  
9 site.

10 This brings us up to late '87, early '88  
11 when they received their notices of violations.  
12 Ekotek had gone out of business. Petrochem had gone  
13 out of business. At that time the site was  
14 abandoned, and the State of Utah went out there to  
15 investigate what exactly was left over at the site.  
16 Next slide, please.

17 What they found, things like this. They  
18 found a mess, basically. Lots of tanks, some that  
19 were -- had contents in them some didn't. A lot of  
20 left over sludge, stained soil. In other words, it  
21 presented an immediate threat to human health.

22 Utah, State of Utah realized it had a  
23 much bigger problem an its lands than our resources  
24 could deal with. So we called in at that point the  
25 U.S. Environmental Protection Agency, EPA, because

1     they had much broader resources, and asked them for  
2     their help. And between the two of us -- basically,  
3     the EPA went out and performed an emergency removal  
4     action.

5             We went to the site, and what we found,  
6     there were altogether over 60 of these above ground  
7     storage tanks. Mostly located in the northern end of  
8     the tank farm area. Found over 60 above ground tanks  
9     plus associated pipings and fittings. Found several  
10    underground storage tanks. The volume of liquid that  
11    was left over and contents in those tanks was  
12    estimated at between 200 to 400,000 gallons.  
13    There's -- within the five warehouses that were on  
14    the site, they found about 500 55-gallon drums and  
15    lots of other smaller containers that contained used  
16    oils and other miscellaneous solvents and about 1,100  
17    tons of industrial waste in the form of filter cake  
18    sludge. The specific contaminants found on the site  
19    included chlorinated solvents organics,  
20    hydrocarbons, pesticides, metals, dioxins, and some  
21    PCB'S.

22            The emergency response began  
23    Thanksgiving weekend of November 1988 with the EPA  
24    being the predominant facility agency out there, UDEQ  
25    backing them up as needed. The first thing they did

1 was stabilize the site. Next slide.

2 This meant putting up a fence around the  
3 perimeter of the site so nobody could get on there,  
4 keeping all trespassers off, doing an inventory of  
5 the site, going through the drums and the various  
6 containers, finding out what chemicals were on the  
7 site, taking an inventory of this, shipping off  
8 the -- disposing of the waste and shipping off the  
9 tanks and containers for offsite disposal.

10 It was also at about this time that some  
11 of the parties that had been -- we call them  
12 potentially responsible parties. Basically parties  
13 that had either generated or transported or stored  
14 the waste to the site, they were later called  
15 potentially responsible parties. They banded  
16 together, formed a committee called the Ekotek Site  
17 Remediation Committee, and they have been primarily  
18 responsible for paying the costs of both the removal  
19 activity and the activity that's occurred since then.  
20 The removal occurred basically from 1990 to '92, cost  
21 estimated between 8 and \$10 million. The committee  
22 pretty much paid for that whole thing. Next slide,  
23 please.

24 The removal continued like I say, for  
25 the two years, '90 to '92. Basically what it did,

1 they sampled the air, the soil, the ground water.  
2 They took about 650 empty drums, crushed them, sent  
3 them offsite. About 2,300 smaller containers, they  
4 identified the contents, shipped them offsite as well  
5 as the containers, and the tank farm area, this area  
6 to the north, where the majority of contamination was  
7 located, it's located in this area here in the north  
8 end, the tank farm, they took off the tanks and the  
9 pipes and shipped them offsite for recycling, mostly.  
10 Took the contents, shipped them off to an  
11 incinerator. And there's -- there were retention  
12 ponds at the time that were collecting water during  
13 this whole process. They took that -- stored that  
14 water, treated it, sampled it, and then disposed of  
15 it into the sewage system.

16 This brings us up to 1992. At this  
17 time, the removal -- the emergency removal process.  
18 pretty much came to an end. And at that time, it was  
19 listed as a Superfund site. So what this meant was  
20 that the emergency removal response dealt with the  
21 immediate threats to the public health at that time.  
22 With all the various containers and drums and the  
23 contents of all that stuff on site.

24 Once that was removed, the Superfund  
25 process dealt with the more long-term chronic threats

1 to the public health, and what this has meant is that  
2 there's been an extensive amount of data collection,  
3 data gathering and analyzing the data, putting it all  
4 together to define the extent of the contamination on  
5 the site. And then secondly to come up with a  
6 solution as far as how to treat the waste. What to  
7 do with the contamination. So Dan Thornton, EPA, is  
8 going to go into that whole process called the RI/FS  
9 process.

10 That pretty much concludes my  
11 presentation at this time. I'll turn it over to Dan  
12 Thornton.

13 MR. DAN THORNTON: If anyone can't see  
14 these overheads, please let us know. Following on  
15 is J.D.'s discussion, basically what I'd like to say,  
16 there are two sides to the Superfund process. We do  
17 emergency removal actions under the emergency  
18 is response group, and, we also do long-term remedial.  
19 actions in the remedial group. I'm part of the  
20 remedial group.

21 What we talked about before, the removal  
22 actions where they took away most of the immediate  
23 threats at the site, they were dealing with tanks  
24 that were sitting at an abandoned site. Animals  
25 could come up and let the whole thing flow out of the



1 ground. It was uncontrolled. What they were dealing  
2 with in that instance were imminent and substantial  
3 endangerments to human health and the environment.

4 What we're looking at is a little bit  
5 longer term, maybe more subtle effects that could be  
6 caused by wastes that aren't going to blow up or  
7 necessarily get out of our control, but they're there  
8 on the site, and we've looked at that in the  
9 Superfund process. Now we're trying to address those  
10 concerns with a remedial plan.

11 What we see here is basically just a  
12 diagram that shows what happens once the site's been  
13 placed on the national priorities list as a Superfund  
14 priority site. We start by doing a remedial  
15 investigation. We gather data. We pull that  
16 together to look at the remedial options. The ways  
17 we can clean up the site. Then we publish a proposed  
18 plan. This happened early this month. And then once  
19 that's been done we hold a public meeting, we talk to  
20 people about it, we solicit their comments, whether  
21 they think our evaluation was accurate, if they think  
22 we're doing enough or doing too much, then we move on  
23 to later stages in the process. Next slide, please.

24 This slide has the same categories over  
25 here. What we're doing is I'm taking a few steps

1 back in the process to help you understand how we  
2 arrived at the plan the way we did. In remedial  
3 investigation, we do extensive data collection. That  
4 follows on with data collection that occurred during  
5 those removal actions. For example, we want to know  
6 if we're getting all the waste. We looked around,  
7 take soil samples, we did extensive characterization  
8 of what was in the ground water, we looked at other  
9 waste categories and tried to figure out what we were  
10 dealing with and how bad it was.

11 After we've done some data collection,  
12 even just looking at old manifests for the site,  
13 looking at the history of the site, how it operated  
14 and what they handled, we begin doing exposure  
15 assessments. We look at the potential targets, human  
16 health, ecological health, that could be impacted by  
17 the site. We look at the potential exposure routes  
18 for those contaminants. We also do toxicity  
19 assessments where we look at the contaminants, how  
20 poisonous they are, what the effects of them would  
21 be, and the dose received. All of this information  
22 is pulled together into the risk characterization.  
23 Next slide, please.

24 So what we do, we start trying to figure  
25 out what the risks are based on the contaminants and

1       their availability. Next slide, please.

2               How can risk occur? It's hard for some  
3       of you to see this. We start with the source. There  
4       has to be some kind of contamination that's not  
5       controlled. Okay? We find a route of transport.  
6       That's going to be one of the media at the site.  
7       Ground water, soil, surface water, or air. Okay?  
8       There's a point of exposure. That just means that  
9       someone or something, animal, wetland, sensitive  
10      environment, something comes in contact with that  
11      chemical that we're concerned about. There's an  
12      exposure route. There's some kind of uptake. People  
13      drink the ground water, they drink the surface water,  
14      they go swimming, they fish, they eat the fish, they  
15      breathe air, they breathe dust, they eat with their  
16      hands dirty or kids playing in the dirt. You have  
17      your receptor. That's whoever is being affected or  
18      the sensitive environment. Then again, looking at  
19      the toxicity of the substances in question, we pull  
20      together an evaluation of what the potential risks at  
21      a site would be. Next slide, please.

22              Okay. Basically, at the  
23      Petrochem/Ekotek site, we had three major exposure  
24      assessments. We were looking at industrial workers  
25      who would be on the site, we were looking at lifetime

1 residents of the area near the site, we were looking  
2 at resident adults. Each one of these represents  
3 different ways that targets could come in contact  
4 with those wastes. There's soil exposures. People  
5 can have dermal contact, they could absorb those  
6 wastes through the skin possibly. We have lifetime  
7 residents, maybe drinking ground water in the future,  
8 okay? We have resident adults who if they tapped  
9 into that ground water source might be showering,  
10 they could have absorption through the skin of  
11 volatile substances that come up in the ground water,  
12 they could be breathing the vapor. So we counted all  
13 of those in the risk assessment. Next slide, please.

14 We made a baseline risk assessment.  
15 Now, a baseline risk assessment looks at what's going  
16 on at the site. If we didn't do anything, conditions  
17 might stay the same, they might get worse. We're  
18 saying if we didn't do anything what's the worst  
19 thing that could happen at this site? Currently the  
20 ground water doesn't appear to be moving  
21 significantly offsite. There's a contaminated plume  
22 that -- it seems to be staying fairly stable. The  
23 baseline looks at what might happen if that migrated.  
24 If it went into another aquifer formation where  
25 people had a municipal well, if they had private

1 wells. We also look at what would happen if access  
2 restrictions, like J.D. mentioned, were to fail. Say  
3 they didn't maintain the fence. Say the  
4 institutional controls that warn people not to drill  
5 or well into that aquifer weren't to hold and someone  
6 did that. What would happen? Next slide, please.

7 All of these kind of assumptions are  
8 used basically to provide the information we need to  
9 look at potential health impacts at this site.

10 What's going to happen if we leave the site the way  
11 it is? Why do we need to clean it up? It also  
12 provides us on a national level a certain amount of  
13 consistency, because we know we're addressing sites  
14 based on standard levels of risk.

15 What is a baseline risk assessment?

16 Well, when we say it's protective of human health and  
17 environment, what we're meaning by that is that we  
18 make conservative assumptions. Okay? We look at the  
19 possibility that we could make a mistake. We want to  
20 make sure that if we make an error, we're not saying  
21 that people didn't get exposed when they actually  
22 did. Okay? It's also based upon the available  
23 toxicological studies and site specific information,  
24 that both J.D. and I mentioned before. The aquifer  
25 characterization studies that we've done, soil

1 samples, okay? All throughout the process, this  
2 information is pulled together.

3 What does the risk assessment do for us?  
4 Well, we already mentioned. It determines how likely  
5 the site is to pose a health threat to both humans  
6 and the environment. It also indicates which  
7 chemicals we should pay the most attention to. Where  
8 is the real threat? Where's the real risk? It looks  
9 at how people could come into contact, the exposure  
10 routes we talked about. It identifies the need to  
11 take action. Do we need to take action? How soon do  
12 we need to take action? It also identifies  
13 contamination problems that need to be addressed.  
14 Sometimes there might be lesser ones we're not so  
15 sure about.

16 Now, some of the things our risk  
17 assessment does not do is determine specific health  
18 effects that have occurred or will occur, it doesn't  
19 identify the specific individuals who are likely to  
20 have health problems due to a site, and it doesn't  
21 pick out the technologies for us. In part, these  
22 things are done by other studies that were done by  
23 other agencies at the site. And basically what the  
24 risk assessment is doing for EPA and the State is  
25 providing framework for us to help evaluate the

1 alternatives that we're going to pull together at  
2 later stages. We already have pulled together,  
3 rather.

4           Some basic information about what we  
5 found at the site. EPA has a standard set of  
6 chemicals they look for when they start at a site.  
7 From that list, we develop the list of contaminants  
8 of concern. At this particular site we found  
9 evidence of 22 different contaminants of concern.  
10 Okay? I've classed those into three groups. We have  
11 noncarcinogenic substances, those that cause any  
12 health effect other than cancer. We have the  
13 carcinogenic substances, those that do cause cancer.  
14 And then we have a set of five over here out of the  
15 22 who have effects in both of these areas. So they  
16 can cause cancer, and they can have other effects.

17           What do I mean by other effects? Well,  
18 there can be respiratory effects, they can cause  
19 trouble breathing, there can be neurological effects.  
20 If it's central nervous system it can cause trouble  
21 with memory and learning, peripheral nervous system,  
22 can cause trouble with coordination, balance,  
23 sensation. Next slide, please.

24           The specific chemicals that followed  
25 through the analysis and were found in sufficient

1 levels to cause concern were evaluated again based on  
2 whether they were carcinogenic, noncarcinogenic, or  
3 both. In the case of noncarcinogenic chemicals, we  
4 have arsenic and thallium. Both of these are metals.  
5 The arsenic fits into the category of both.  
6 Carcinogenics. We had the arsenic and also vinyl  
7 chloride. Okay?

8 So based on this evaluation and the risk  
9 assessment that was done at the site, we looked at  
10 the future uses of the site. It's important to note  
11 that we did not find any current risks at the site  
12 that were significant enough to warrant a risk  
13 evaluation. Or that didn't fall through risk  
14 evaluation. Because as J.D. mentioned, the site's  
15 been fenced. There is a guard who comes by  
16 occasionally and makes sure people aren't getting on  
17 the site. We don't believe that these contaminants  
18 are presently available by exposure pathways. We  
19 base this risk assessment on future use of the site.  
20 Are there any questions so far? Yes?

21 UNIDENTIFIED: Wasn't thallium taken out of  
22 the risk assessment?

23 MR. DAN THORNTON: I don't believe it was  
24 taken out of the risk assessment. But there aren't  
25 any remedial alternatives that are going to address



1 that. Whether we consider something to be naturally  
2 occurring or not, it's still a risk. I'd like to get  
3 into the next part here. I should probably try to  
4 address the questions at the end. I'm sorry. I know  
5 a lot of people have questions, and we could get  
6 derailed here. I've got about 15 minutes.

7 We've taken these risks. We've looked  
8 at what's going on at the site, the likely exposures,  
9 whether or not it's something to be concerned about.  
10 We've begun looking at the media that are  
11 contaminated at the site and how we're going to try  
12 to address those. Okay?

13 We've summarized our cleanup options  
14 under the next step. I was talking about the  
15 is remedial investigation. Now we have a feasibility  
16 study that takes these different cleanup  
17 technologies, looks at what we can do and the  
18 benefits we're going to get from those, and then we  
19 pull together 10 remedial options. Next slide.

20 There were three major media at the site  
21 that we're concerned about. Air exposures are no  
22 longer a threat. Basically, the removal actions that  
23 J.D. described took care of air emissions. Most of  
24 the air emissions were based on activities at the  
25 site, not what was left after the businesses went

1 under. What we have are contaminated soils,  
2 contaminated ground water, and there was contaminated  
3 surface water. I think the major concern with that  
4 right now is just protecting surface water resources  
5 to the north of the site. Again, I think the removal  
6 action addressed whatever surface releases might have  
7 been going on at the site. So now we're really just  
8 looking at the ground water and the soil.

9 What we have here is a map of the site  
10 that goes into the basic areas where we found  
11 contamination during these studies. All right? Some  
12 of you probably read the proposed plan. This is the  
13 map that was there. Okay? What we see here inside  
14 of the larger dotted line area with the vertical  
15 lines is the extent of the floating oily substances  
16 that we find on top of the ground water. Okay? The  
17 substances separate just like Italian dressing would.  
18 The oil sits on top, the water in underneath that.  
19 They're not really mixing a whole lot. All right?

20 They also seem to be fairly stable. You  
21 see this ground water plume has been there for quite  
22 some time, as far as we can tell. And yet it hasn't  
23 been significantly moving off the site. We're very  
24 lucky in that sense. Okay?

25 These are -- it's difficult to really

1 understand the slide just looking at it. What we're  
2 seeing is an image in three dimensions. The ground  
3 water is at the base of what we're looking at. It's  
4 at least 15 feet below the surface. That plume of  
5 oily liquids is sitting on top of it. Perhaps as deep  
6 as, you know, to 10 feet below the surface  
7 soils. Okay? Then we have contaminated surface  
8 soils that have been identified throughout the  
9 process. We have a total extractable hydrocarbon  
10 spot where the levels exceed 100,000 parts per  
11 million. And basically, those are surface soils,  
12 maybe down to a depth of a foot or so. So that  
13 during the remediation of the site, what we'd see is  
14 removing those surface soils, there may be clean  
15 soils for the next eight feet. To get at that plume,  
16 a lot of that will have to be removed and stockpiled.

17 Okay. What we did as I mentioned before  
18 is we looked at the cleanup options by medium.  
19 Basically for the soils. There were seven different  
20 options that were considered. Okay? We always start  
21 by considering no further action. This is a legal  
22 requirement that the agency fulfills, because we have  
23 to look at the benefits of doing something at the  
24 site versus what would happen if we didn't do  
25 anything. That's just standard practice. So the

1 first is always no further action.

2 Any of the ones that you see in red with  
3 a star did not pass the evaluation. We looked at  
4 whether or not it would be protective, whether it  
5 would meet the appropriate laws that it has to meet,  
6 and we found that those ones did not. In the other  
7 cases, there's a lot of excavation and different  
8 types of treatment for landfill disposal. Basically  
9 what we're looking at is just increases in the  
10 volumes that we're dealing with from one to the next.  
11 Okay?

12 The selected remedy, we chose this one  
13 down here. Essentially excavation thermal treatment  
14 on site of all of those contaminated soils.

15 For ground water we had six options, and  
16 then we added two contingencies to the evaluation.  
17 Again, it starts with no action. We considered  
18 containment on site with a subsurface barrier. It's  
19 basically surrounded with a clay type substance.  
20 Almost an underground wall. So that you can't get  
21 any lateral migration. The stuff won't move offsite.  
22 One of the problems with that is it can still move up  
23 and down. We don't know if it's going to contain it.  
24 It didn't pass the evaluation.

25 Other options, we considered intrinsic

1 remediation or attenuation, which is basically  
2 waiting for nature to take its course. Some of these  
3 substances, particularly the chlorinated organic  
4 solvents, may break down naturally. In this case,  
5 that's a possibility. It was considered as an  
6 alternative.

7 Physical treatment basically means  
8 leaving the ground water in place. We're going to  
9 pump air up through the ground water. Those volatile  
10 substances would come out in the air. We siphon that  
11 off and treat the air. That's another way to deal  
12 with the ground water contamination.

13 The preferred remedy is extraction from  
14 40 to 100 gallons per minute and sending that down to  
15 the municipal treatment work site. POTW. I  
16 apologize for the acronyms. Basically, that means  
17 public treatment works. We mean the municipal sewage  
18 facility. That's what we chose. Extraction and  
19 direct treatment means construction of an onsite  
20 facility for treating the ground water and  
21 reinjecting it.

22 The contingencies basically deal with  
23 possibilities. Okay? We're not that concerned right  
24 now, because we don't see a lot of movement in the  
25 ground water. What we did is we made a contingency.

1 For example, number two for containment of that vinyl  
2 chloride plume. If we start to see it move, if we're  
3 concerned that it's going to get away from us and get  
4 out of control, that's when we'll institute that. It  
5 involves some wells and pumping and sending the water  
6 out.

7 The arsenic contingency is basically to  
8 sit and sample the water and see if the arsenic  
9 levels rise again. The beginning of the process,  
10 when we began looking at this, we saw very high  
11 levels. They haven't been repeated, so we're holding  
12 that in reserve just in case we need to do it. We're  
13 not sure it's going to need to be part of the remedy.  
14 These are considered contingencies to the remedy.  
15 Next slide, please.

16 For buried debris, we again considered  
17 no action. Capping it with clean fill, so basically  
18 trying to contain it on site. We considered partial  
19 excavation, a larger partial excavation, again was  
20 one of the technologies that didn't pass the  
21 evaluation. What we're talking about there is  
22 basically called soil washing. And that was not  
23 considered feasible.

24 And then the last one is a partial  
25 excavation, taking out some of the saturated soils,

1 creating corridors, basically, in an area of that  
2 plume, and then all of the oily liquids should flow  
3 into those corridors, and they can be pumped out,  
4 drummed, and sent offsite for treatment. That is the  
5 part of Alternative 7 which is currently the  
6 preferred remedy.

7 For the oily liquid wastes which are  
8 also known as light nonaqueous phase liquids, or  
9 LNAPL, we considered five different options. These  
10 were no action, a subsurface barrier, extraction.  
11 Again, these three just represent different volumes.  
12 We were talking about perhaps 75 percent of what we  
13 find, 80 percent of what we find, and up to 100  
14 percent of what we find. Okay?

15 One of the reasons we left the volumes  
16 out of this discussion to this point is because  
17 you're going to have to realize that everything I  
18 mention about volumes is approximate. We really  
19 don't know 100 percent what's down there. The  
20 records from back in the early '80s aren't as good as  
21 we'd like them to be. We think we have a good feel  
22 for what's there, but the cleanup isn't based on  
23 saying we're only going to take 10,000 gallons and  
24 stop. The cleanup is based on saying we're going to  
25 get as much as the technology can get. We're

1 assuming this oily liquid plume will produce about  
2 10,000 gallons of liquid and about 3,000 cubic yards  
3 of saturated soils. Okay?

4 Now, those of you who stopped at the  
5 table in the door have a copy of this table. It's  
6 fairly complicated. But the most important thing to  
7 notice about it is that as we go through the remedial  
8 alternatives that were considered, each one of these  
9 is a combination of all of the different processes I  
10 spoke to in the last four slides. What we're really  
11 seeing is you move from Alternative 1 to Alternative  
12 8 is we move from greater volumes in onsite  
13 containment down to greater volumes in offsite  
14 disposal or onsite treatment. Okay? Moving from  
15 lesser levels to higher levels of treatment, and also  
16 moving from left to right from lower volumes to  
17 higher volumes. So you'll see an increase in cost  
18 differently throughout 1 through 8. You'll also see  
19 an increase in the protectiveness and completeness of  
20 the remedy.

21 Alternative 9 and 10 are special,  
22 because after we completed that initial assessment,  
23 EPA went back and asked for two more addenda to the  
24 feasibility study which looked at new possibilities  
25 Alternative 9 was to incorporate the possibility of



1 land farming the soils that were contaminated.

2 That's basically a composting process that would

3 allow those hydrocarbon wastes to break down.

4 Alternative 10 was to look at another way of possibly

5 containing some of the lower level wastes on site.

6 This basically wraps up my presentation.

7 What we look at here is a slide that talks about how

8 EPA makes its decision looking at all of those

9 alternatives. I understand if you've read the

10 proposed plan, these are fairly complicated. If you

11 do have questions about those, I'd like to try to

12 help people understand a little better. I know it's

13 not a very -- it is a complicated site, and the

14 alternatives we're trying to go through are

15 complicated as well.

16 But basically, what we do once we have

17 those alternatives, we look at nine different

18 standards that tell us whether or not this meets

19 minimum goals. Okay? These first two, protection of

20 human health and the environment, and compliance with

21 applicable, relevant and appropriate requirements,

22 affectionately known as ARARs. And all of those are

23 federal and state requirements that may be outside

24 the realm of the Superfund program. We have to make

25 sure what we are doing complies. Those two are

1 baseline criteria, If you don't meet them, the  
2 alternative doesn't make it into the overall  
3 evaluation. It doesn't it's not part of the final  
4 FS. Okay?

5 From that point on, we look at  
6 short-term effectiveness. Is the actual  
7 implementation of the remedy going to cause  
8 additional exposures? Are there any problems with  
9 that? Long-term effectiveness and permanence is  
10 fairly self-explanatory. I mean, landfilling isn't  
11 necessarily as permanent as some direct treatment  
12 that destroys the contaminants. Reduction of  
13 toxicity, mobility or volume through treatment. We  
14 look at whether or not it's feasible to implement  
15 these options as we've discussed them. We look at  
16 the cost of this part of the remedy.

17 And it's important enough that what  
18 we're talking about today is not the whole picture,  
19 because an J.D. mentioned, just for the removal  
20 actions, almost \$10 million was spent. We're not  
21 sure how much that was. But this is part of the  
22 whole. Okay?

23 And then we look at State acceptance and  
24 community acceptance. A large part of that is what  
25 we're doing here now. We published a proposed plan

1 with a preferred remedy. This is what we believe to  
2 be the best approach to the contaminations we found  
3 at this site. But your input is going to be very  
4 important in making the final decision, and then when  
5 we have that, we'll be prepared to write a record of  
6 decision and come out with a final plan. Okay?

7 So just to recap, I went through those  
8 alternatives and sort of showed you which parts of  
9 that were part of Alternative 7. Now what I want to  
10 do is show you in essence. Alternative 7 involves  
11 the excavation and treatment of the surface soils.  
12 Essentially about 22,000 cubic yards. Okay? That's  
13 part of a larger soils treatment. You have to  
14 understand. Okay? The buried debris area and the  
15 oily liquid wastes plume are also going to involve an  
16 extraction of soils. In order to get treatment of  
17 those, we're going to have to blend all of these  
18 is soils together so that the treatment technology will  
19 work. So basically, that's all going to be done  
20 together at once. Okay?

21 We also have excavation of the oily  
22 liquid wastes. 3,000 cubic yards of soil will be  
23 taken out, but then the rest of that is going to be  
24 skimmed out using a pump and skimming machine. It  
25 will be drummed and sent offsite for treatment.

1           The ground water extraction. Again,  
2       we're looking at a direct treatment technology here.  
3       We're extracting the ground water at a fairly -- I  
4       don't think it's an extreme rate. We have a very  
5       porous aquifer with a very high production of water.  
6       So we can get that. And basically, we would just be  
7       sending that down to a municipal treatment plant.  
8       And then finally, we're going to excavate the debris  
9       area and dispose of that debris.

10           All of these options are going to depend  
11       in part on what we find when we get to the site.  
12       We've got other stages to this process where we're  
13       going to be looking at what's there and what are our  
14       alternatives. But essentially, that's how  
15       Alternative 7 plays out. Thank you.

16           MS. NANCY MUELLER: Thanks, Dan. Now we're  
17       coming to your part of the meeting. Before we get  
18       started, though, I'd like to just maybe lay down a  
19       few ground rules and introduce a person that I forgot  
20       that's pretty key to this process. This is Mary  
21       Quinn. She's a certified court reporter. She will  
22       be preparing a transcript of this meeting tonight  
23       which will be put into the administrative record up  
24       at the Marriott Special Collections Library at the  
25       University of Utah as well as being available at the

1 record center in Denver at the EPA offices.

2 A couple of the ground rules that we'd  
3 like to -- I'd like to give you. First of all, all  
4 comments are welcome. We're here to listen to you.  
5 We want to hear what you have to say. Because  
6 there's some residents that are here this evening,  
7 we'd like to give them first chance to give their  
8 comments, either residents or representatives of --  
9 we have a community group that's represented here  
10 that has been very active in working with us on a lot  
11 of the issues at the site. So we'd like to let the  
12 private citizens, if you will, have a say first. If  
13 you didn't sign up, that's no problem. We'll still  
14 let you make comment. If you signed up and changed  
15 is your mind, that's no problem either. You don't have  
16 to say anything.

17 Because there's quite a few of you here  
18 tonight, we'd like to give everybody a chance to have  
19 their say. We'd like you to keep your comments as  
20 brief and to the point as possible. And if you can,  
21 three to five minutes would be great.

22 Mary has asked that when you do stand to  
23 give your comments, please state your name very  
24 clearly to her, and if it's, an unusual spelling,  
25 spell it for her too. It's important that we get

1 that right in the transcript. And if you come back  
2 for a second comment, please state your name the  
3 second time as well.

4 Jim just reminded me if after you've  
5 been here tonight and even if you've made a comment  
6 tonight, you can still submit written comments to us.  
7 Right now, the close of the comment period is the 8th  
8 of August, I believe. Those comments need to come in  
9 to Dan by that time. The address is in the proposed  
10 plan. There's extra copies out at the sign-in table  
11 by the front door. If you didn't get one or if you  
12 don't have it anymore, please feel free.

13 Dan just informed me that we've received  
14 a request to extend the public comment period, so you  
15 have 30 days beyond what the proposed plan says.  
16 That will be published in the newspaper in Salt Lake  
17 here announcing that extension. So we'll go into the  
18 first week of September now. I can't count my days  
19 quite that fast. I don't want to make another  
20 mistake.

21 So with that, I've got the sign-in  
22 sheet. Renette, were there any more? Okay. You  
23 signed in as you came in. And we have some -- we  
24 have two community representatives that we'd like to  
25 give their chance to. The first one is Paul

1 Anderson. And he is the technical consultant for the  
2 group for the Petrochem site. September 7th is when  
3 the public comment period is closed.

4 MR. PAUL ANDERSON: I'll read this into the  
5 record. My name is Paul Anderson. I'm a consulting  
6 geologist and the Capitol Hill Neighborhood Council's  
7 technical advisor on the Petrochem/Ekotek site.

8 The trustees of the council met last  
9 week and reviewed EPA's proposed plan for the site.  
10 The trustees are an executive body of the Council  
11 with representatives from various neighborhoods or  
12 areas within the Council boundaries. The trustees  
13 decided to make a statement at this meeting, but the  
14 Capitol Hill Neighborhood Council has not reviewed  
15 the preferences of the trustees and reserves the  
16 right to revise its position on the proposed plan  
17 after the full Council meets in mid August. The  
18 Council asked for a 30-day extension to the public  
19 comment period in order for the full Council to  
20 discuss the proposed plan and make written comments.

21 The Council trustees support the  
22 recommendations of the Capital Hill Neighborhood  
23 Council's Ekotek Committee which in February of 1995  
24 expressed to EPA and the State a preference for  
25 Alternative 6. After review of the proposed plan and

1 new Alternatives 9 and 10, the trustees see no  
2 compelling reason to change their recommendation to  
3 the EPA and the State of Utah. Alternative 6 remains  
4 their preferred alternative.

5 Alternative 6 differs from EPA's  
6 selected Alternative 7 in addressing the cleanup of  
7 contaminated ground water at the site. EPA has  
8 selected a pump and treat technology for ground water  
9 cleanup. The trustees prefer the use of intrinsic  
10 remediation for the following reasons:

11 One. Ground water contamination is  
12 limited to the uppermost or shallow aquifer. This  
13 aquifer is not used for drinking water in the local  
14 area.

15 Two. The levels of contamination are  
16 very low and limited, based on the last few  
17 sampling -- episodes of sampling, to vinyl chloride.

18 Three. Recent sampling and the expanded  
19 network of monitoring wells indicate that an offsite  
20 source of the parent product of vinyl chloride  
21 exists. Until this source is located and removed, it  
22 is unreasonable to attempt to aggressively -- to  
23 attempt to aggressively pump and treat onsite ground.  
24 water.

25 Four. Hydrogeologic data indicates that



1 under present conditions, the likelihood of migration  
2 of the plume into the deeper principal aquifer, the  
3 one used for drinking -- which is used for drinking  
4 water, is remote. It also appears to the trustees  
5 unlikely that the shallow aquifer would be considered  
6 as a source of drinking water in the next decade,  
7 which is the estimated time required for intrinsic  
8 remediation to prove effective.

9 Five. Geochemical conditions at the  
10 site indicate a reasonable probability that intrinsic  
11 remediation will work. The trustees recognize the  
12 need for continued monitoring with the possible  
13 expansion of both the constituents monitored and the  
14 number of monitoring locations.

15 Six. intrinsic remediation represents  
16 some risk in that it is not a proven technology at  
17 this site, but the cost is much lower than the pump  
18 and treat alternative, and it is not clear that the  
19 risk is any greater.

20 The trustees encourage EPA to consider  
21 proceeding with the soils cleanup if the debate on  
22 how to clean up the ground water appears to be an  
23 extended one. Thank you for the opportunity to  
24 comment.

25 MS. NANCY MUELLER: Thank you. The other

1 community representative is Karen Silver from the  
2 Salt Lake community action program. Karen?

3 MS. KAREN SILVER: I have no comments at  
4 this time.

5 MS. NANCY MUELLER: Thank you. Okay. I'm  
6 going to start going down the list now. I may mangle  
7 your names. So bear with me, please. First name on  
8 here, Denise Kennedy. Are there any other residents.  
9 that didn't sign up that would like to say something  
10 before Denise gets started? Okay. If you change  
11 your mind, you can still come back.

12 MS. DENISE KENNEDY: I'm Denise Kennedy  
13 with the law firm of Holland Hart. And we're  
14 common counsel for the Ekotek Site Remediation  
15 Committee which is a group of about 43 companies that  
16 were all customers of the Ekotek site and have been  
17 working with EPA and the State of Utah in cleaning up  
18 the emergency removal action that J.D. Keetley  
19 referred to, conducting the remedial investigation  
20 and feasibility study.

21 If anybody wants to move up, feel free.  
22 We don't have overhead. We've just got these  
23 graphics. But you can all see those, hopefully.

24 We've got individual representatives of  
25 some of the Committee members here. Some of them

1 will make statements after the Committee presentation  
2 is concluded, and others will -- we just want you to  
3 know they're here, they're committed to working with  
4 the State and EPA and the community on the cleanup.

5 Those companies that are represented  
6 there tonight are Union Pacific, Kennecott, Quaker  
7 State Minute Lube, U.S. Steel, DHP Minerals, Parker  
8 Hambly, and Texaco.

9 By way of background, I want to explain  
10 a little bit of the Committee's involvement with the  
11 site. The Committee members are all essentially  
12 innocent customers of the Ekotek site. They used the  
13 Ekotek site. They had used oil or hazardous waste  
14 that had to be disposed of. The Ekotek site was a  
15 is fully permitted, regulated facility legally entitled  
16 to accept those wastes. And the Committee members  
17 relied on the regulatory -- the regulatory  
18 authorities in sending wastes to the site.

19 Unfortunately, the law that is at issue  
20 here tonight, Superfund, doesn't care about whether  
21 you did something wrong or not. It imposes liability  
22 in a situation here where the owners have all gone  
23 bankrupt. There was actually a criminal proceeding  
24 against the owners of the site for not complying with  
25 the law. But again, we're dealing with -- no one is

1 at fault in terms of the parties that are going to be  
2 responsible for paying the cleanup costs of the site.

3 The Committee has already spent about  
4 \$17 million in the removal action at the site and  
5 conducting a remedial investigation feasibility  
6 study. The prior work that's been done at the site  
7 addressed the immediate problems. If you go out and  
8 look at the site today, it looks very different from  
9 the pictures we saw today. There are a few buildings  
10 remaining on site, but otherwise all of the tanks,  
11 all of the visible contamination problems are gone.  
12 Now with the remedial investigation and the  
13 feasibility study completed, it's time to talk about  
14 what additional cleanup actions need to be taken at  
15 this site.

16 Because there is no fault on the part of  
17 the Committee members, no environmental laws were  
18 violated in connection with their use of the site,  
19 the cleanup should not be a punitive cleanup. We  
20 should not be punishing the companies that are  
21 basically under the law having to come forward and  
22 pay for the cleanup of the site. The law requires  
23 that the most effective cleanup that protects human  
24 health and the environment and meets the cleanup  
25 standards be selected. We don't believe that's been

1     done here. Just because we've got viable companies  
2     doesn't justify selecting a cleanup method that is  
3     ten and a half million dollars more expensive than a  
4     cleanup remedy that meets all of the standards.

5             These are strong words. The comments  
6     that are going to follow by some of the other  
7     representatives of the Committee will strongly  
8     support a different, less expensive remedy, but  
9     again, one that we believe meets all of the cleanup  
10    requirements. I don't want you to lose sight,  
11    though, of the fact that the Committee is committed  
12    to a safe cleanup. And we want to get that site  
13    cleaned up, we want it to be protective of human  
14    health and the environment, and we want that site to  
15    get put back into use. We want someone to come back  
16    in and get that site -- redevelop the site so that we  
17    don't have a blight on the neighborhood.

18            I want to just kind of refer to this chart.  
19    More detail will be gone into by some of the other  
20    representatives. EPA's already gone into some  
21    of the specific detail about Alternative 7 which is EPA's  
22    preferred alternative, and Alternative 10 which  
23    23 is the Committee's preferred alternative.

24            As this chart indicates, and this is  
25    right out of the proposed plan, Figure 3 from the EPA

1 proposed plan, there are three categories here. The minus  
2 sign if a particular remedy doesn't meet the requirement,  
3 and these are the requirements that EPA has to consider  
4 in determining the appropriate remedy at the site. The  
5 check mark says it meets the requirements. And the plus  
6 sign says it fully complies with the requirements.

7 Alternative 7, the black marks are what  
8 appear on the EPA proposed plan. Has pluses across.  
9 The Alternative 10 has some checks and some pluses,  
10 but it meets all of the requirements.

11 As you heard from Paul Anderson, the  
12 representative for the community group, in fact there  
13 is additional ground water information developed by  
14 the Committee over the last three or four months at  
15 considerable expense that EPA had before it came out with  
16 the proposed plan, but because of timing chose  
17 not to consider that information. We understand they  
18 are going to consider this information in this next  
19 comment procedure. But many of the factors alluded  
20 to by Paul Anderson indicate that the pump and treat  
21 option on the ground water simply will not work.

22 When you review the text of the proposed  
23 plan, it indicates that the reason they've determined  
24 that Alternative 7 gets a plus and not a check for

1     protectiveness is because they deemed that pump and treat  
2     is more protective than the intrinsic  
3     remediation. When you review the ARARs, ARARs are  
4     the applicable, relevant and appropriate standards,  
5     essentially the ground water cleanup standard, again  
6     in reviewing the text of the proposed plan, is the  
7     basis for EPA considering this to be a plus. They believe  
8     pump and treat is more effective than  
9     intrinsic remediation. Again, that's not considering this  
10    recent ground water information. Similarly,  
11    here, implementability. They both get pluses.

12                 This additional ground water information  
13    suggests that pump and treat is something not  
14    implementable. It's not a feasible technology at  
15    this site.

16                 Cost. EPA should be comparing the costs.  
17    Here we've got ten and a half million dollars  
18    less. In our minds, that renders this fully in compliance  
19    with the cost effectiveness, and in light  
20    of some of the less expensive remedies, that would  
21    give this one a negative sign.

22                 In considering the additional ground  
23    water information that's been developed and the cost,  
24    Alternative 10 actually ranks higher than the EPA  
25    alternative.

1 I just want to introduce briefly the --  
2 there will be four people following me who are all  
3 representatives of the Committee. And I'd like to briefly  
4 refer to them and indicate what they are going to be  
5 talking about. We'll have Sarah Black with  
6 Rust Environmental and Infrastructure. She was the  
7 project coordinator on the remedial investigation  
8 feasibility study. The Committee actually did that work.  
9 EPA made sure we, did it right and complied  
10 with the requirements. But we actually did the work  
11 in the remedial investigation and feasibility study.  
12 It was Sarah that headed up that project.

13 Sarah is going to compare the cleanup  
14 elements of Alternative 7 and Alternative 10. In  
15 addition, we'll discuss this now ground water  
16 monitoring information indicating that there is an  
17 offsite source of a precursor to the vinyl chloride. It's  
18 a solvent that has been measured offsite  
19 upgradient of the site that we know to be -- as it breaks  
20 down, it will break down to vinyl chloride,  
21 and we believe that is a significant source of the  
22 vinyl chloride we're measuring onsite.

23 Arsenic is a naturally occurring ground  
24 water constituent in the Salt Lake Valley rather than  
25 something that's attributable to the site operations.



1 Dr. Jennifer Heath will follow Sarah. Woodward-Clyde  
2 Consultants. She was involved in working with EPA. She'll  
3 discuss the risk assessment and why the Committee's  
4 preferred alternative fully protects  
5 human health and the environment, meeting all the cleanup  
6 standards.

7 Dr. Bob Berry is a senior hydrogeologist  
8 with Shepherd Miller out of Fort Collins in Colorado.  
9 He's going to talk about the recent ground water work  
10 that we've all been referring to that's been done,  
11 what it tells us about why pump and treat won't work, and  
12 why, hydrogeologically and given the offsite  
13 source of TCA and the naturally occurring arsenic  
14 contamination, pump and treat simply will not work at  
15 this site.

16 Dr. Ed Bouwer is a professor at Johns  
17 Hopkins University. He's a nationally renowned  
18 expert on intrinsic bioremediation of these solvents.  
19 He's the author of two books. One is funded by the  
20 National Research Council, the other was funded by  
21 EPA. Actually, sorry, he was cooperating or working  
22 on those books. There were many authors involved.  
23 One was a National Research Council book, and one was  
24 sponsored by EPA. The books together demonstrate  
25 that pump and treat has been attempted at numerous

1 contaminated sites throughout the country and simply  
2 has not worked.

3 Intrinsic bioremediation appears to be the  
4 most promising remedy for ground water for these  
5 organic solvents that we're dealing with. He'll give  
6 his opinion that intrinsic bioremediation would be  
7 effective at the site and his conclusion that the offsite  
8 plume of the organic solvent that's moving  
9 onto the site is a contributing factor to the vinyl  
10 chloride measured on site.

11 With that, I'll sit down and let Sarah  
12 Black comment.

13 MS. SARAH BLACK: I'll bring up a couple of  
14 these posters as well. My name is Sarah Black with  
15 Rust Environmental and Infrastructure as Denise  
16 indicated. I've been involved with the project since  
17 1991. And I'd like to just take a few moments to  
18 compare the two alternatives that are being talked  
19 about here tonight. Alternative 7, which is  
20 preferred by EPA, and Alternative 10, which the Committee  
21 prefers.

22 We'd like to point out that both  
23 alternatives meet EPA's standards and requirements,  
24 as Denise just showed with her graphic. We don't  
25 believe that Alternative 7 is necessary. Both

1 alternatives accomplish the same goals for soils with  
2 risks greater than one in 10,000 for the floating oil and  
3 for the debris area. And that is that the --  
4 what we call the hot spot soils are those soils with  
5 risks greater than one in 10,000 will be either  
6 treated on site or taken off site for disposal. The  
7 oil will be excavated and either treated on site,  
8 again, or taken offsite for disposal. And the debris  
9 area, same situation. It will either be -- with both  
10 alternatives would be excavated and either treated  
11 with onsite treatment or taken off-for disposal. The  
12 differences come in how the excavated soil and ground  
13 water are dealt with, as Denise indicated.

14 Alternative 7 would thermally treat all  
15 of the excavated soil that would have to be removed  
16 to get at the oil. And that would be accomplished  
17 with a thermal desorption unit that would be moved  
18 onto the property and operated for several months.

19 Alternative 10 by contrast puts three  
20 feet of clean soil which would be imported, clean  
21 soil purchased as back-fill into the excavation at  
22 the ground water table. Replaces the excavated soil  
23 in on top of that clean soil and then places three  
24 and a half feet of clean soil at the surface to  
25 prevent exposure.

1           If you think back to Dan's discussion of  
2 risk, he talked about how that exposure has to be present  
3 to cause risk. We feel that -- we've  
4 actually got a little graphic here that shows a cross  
5 section through the site that demonstrates -- if you  
6 can't see this, we'll have it in the back here -- but  
7 this shows the clean, soil that would be placed at the  
8 water table, the replaced stockpiled soil, and three  
9 and a half feet of clean soil at the surface to  
10 prevent any exposure.

11           The three and a half feet of soil in our  
12 opinion prevents any future exposure as well by exceeding  
13 any standard construction techniques or -- standard  
14 construction techniques and utility depth of excavation.

15           In terms of the ground water, we don't  
16 believe that pump and treat is a viable approach.  
17 And our recent data that Denise alluded to shows that the  
18 unique hydrogeology of this site works -- really works  
19 against effective capture of the plume of contaminants.

20           Our monitoring data has revealed that there  
21 actually is another source of solvents  
22 upgradient of the site. TCA is the name of the  
23 solvent that actually can be a precursor to vinyl

1 chloride. We feel that's contributing. And in fact,  
2 in our opinion, pump and treat would never be  
3 effective to accomplish its goal with that other  
4 source present.

5 And finally, ground water treatment. To  
6 address arsenic as a contaminant we don't feel will  
7 be effective since in our view, the arsenic is a  
8 naturally occurring background constituent. It has  
9 occurred in our monitoring at concentrations higher  
10 than EPA's maximum contaminant limit in a well nearby  
11 at 160 parts per billion. And we also have  
12 information for the region that shows that it can  
13 occur higher -- right now in the drinking water  
14 aquifer at higher than EPA's standard.

15 So these issues will be gone into in more  
16 detail by Dr. Berry and Dr. Bouwer. So with  
17 that, I'll turn it over to Jennifer Beath which is  
18 actually going to discuss some more about the risk issues  
19 at the, site. Thank you.

20 MS. JENNIFER HEATH: I am Dr. Jennifer  
21 Beath with Woodward-Clyde. I've been working on  
22 behalf of the Ekotek Site Remediation Committee  
23 representing risk assessment at the site and was  
24 involved with the EPA risk assessors when they did  
25 the human health and ecological risk assessments.

1 Can everyone hear me? What I'd like to talk --

2 UNIDENTIFIED: We didn't get your name.

3 MS. JENNIFER HEATH: I'm Dr. Jennifer Heath.  
4 I've been working on behalf of the Ekotek  
5 Site Remediation Committee for a couple of years at  
6 this site and was involved with the EPA risk  
7 assessors when they performed the risk assessment  
8 that Dan discussed earlier.

9 What I'd like to do this evening is briefly  
10 discuss risks associated with the site prior  
11 to remediation under the current conditions as well  
12 s risks associated with Alternatives 7 and 10.  
13 That's EPA's preferred alternative and the  
14 Committee's preferred alternative.

15 I'd like to step back for, a second and  
16 reiterate something that Dan said in his presentation  
17 about risk assessment. You remember he had an  
18 overhead where off to one side there were four little  
19 boxes about the risk assessment, and one was  
20 exposure, and one was toxicity. And we need to keep  
21 in mind that risk is a function of exposure and  
22 toxicity. You have to have both of them. Exposure  
23 has to do with whether humans or ecological receptors  
24 can come into contact with contaminants from the  
25 site. Toxicity has to with inherent properties of

1 chemicals and adverse effects. You need to have both  
2 a toxic chemical and exposure in order to have the  
3 risk. If there isn't any exposure, there is not any risk.  
4 Indeed, that's what most remediation is doing  
5 is changing how ecological receptors can be exposed  
6 to site related contaminants. It's reducing where  
7 remediation is meant to reduce exposure potential to  
8 contaminants.

9 EPA did as Dan explained what he called a  
10 conservative risk assessment. That means it was a  
11 protective risk assess. And Dan said that pretty clearly.  
12 I just wanted to summarize for you quickly  
13 what the results of that risk assessment was. What  
14 I'm referring to here is back in EPA's proposed plan.  
15 On the top half of Page 5, they briefly summarize the  
16 results of the risk assessment. And that's what I'm  
17 harking back to when I provide you this number which  
18 is one in 100,000.

19 Using the current site conditions where all  
20 the contaminants are now and assuming that there  
21 are workers, industrial sort of indoor office  
22 workers, onsite in a regular work setting. And they  
23 work there 219 days a year for five years. But there  
24 wasn't any cleanup at the site. The risk associated  
25 with the site is one in 100,000. Let's put that into

1 a bit of context.

2 On the other side, we have EPA's risk range  
3 that they stated in policy documents. And the  
4 risk range that EPA has provided is a range of one in  
5 10,000 to one in a million. And if the risk is  
6 within or below that range where the accumulative  
7 risk -- this is a statement out of an EPA policy document  
8 -- where the accumulative risk is less than  
9 one in 10,000, and our risk is one in 100,000, that's less  
10 than one in 10,000, cleanup action generally is  
11 not warranted. So according to EPA policy documents, it's  
12 not necessary to do any remediation at this site  
13 in order to protect human health or also the environment.

14 However, the Committee wants to do  
15 remediation on this site. We want to make it cleaner than  
16 it already is. And so what I'd like to talk  
17 about for just a moment is a quick look at comparison  
18 of residual risks associating with Alternative 7,  
19 EPA's preferred alternative, and Alternative 10, our  
20 alternative, just associated with soil.

21 The other speakers are going to talk  
22 about ground water. Just looking at the soil  
23 remediation aspect, those of them will reduce soil related  
24 risk to a level of one in a million.



1 Right now, this is kind of a diagram that's  
2 showing us where we are now. We're starting  
3 out at ten to the minus five, according to EPA's risk  
4 assessment. We're starting out at a soil related risk  
5 of ten to the minus five. Both of these  
6 alternatives are going to clean it up to ten to the minus  
7 six. Which is at the most protective end of  
8 that range that EPA provides. Both EPA's preferred  
9 alternative as well as ours are going to achieve the same  
10 level of additional protection of human health associated  
11 with the soils.

12 To remind, according to EPA's policy  
13 document, the site would not necessarily require  
14 cleanup as is. Even if it were used in the faculty  
15 is for industrial purposes. We do want to return the site  
16 to productive use. However, we would like to go ahead,  
17 nevertheless, and clean up the soils to an  
18 even cleaner level, and the alternative that Sarah  
19 described where we sort of sandwiched excavated soils  
20 between three feet of clean soil underneath and three and  
21 a half feet of clean soil above precludes any potential  
22 exposure. If there's no exposure, there's no risk. And  
23 therefore, it provides protection to a  
24 very significant level and the same level as EPA's  
25 alternative.

1                   We feel that our alternative is as  
2 protective as EPA's. We would like EPA to be  
3 considering that alternative. Thank you. I'd like  
4 to introduce Dr. Bob Berry.

5                   MR. ROBERT BERRY: I'm Bob Berry. I'm  
6 a hydrologist with Shepherd Miller, a consulting firm  
7 in Fort Collins, Colorado. We are consultants to the  
8 Committee for hydrology to help them understand the  
9 complex hydrology of the site. Apologize for the  
10 small size. You can look at this later after the  
11 talk.

12                   Let me lay some groundwork for you. If  
13 I need to draw, I will. You've heard about pump and treat.  
14 You've heard Paul Anderson say that the  
15 Citizens Committee does not favor pump and treat for  
16 two reasons. One, the plume is not moving on the  
17 site. And the second, there is a potential offsite source  
18 coming into the site. In this case from the mountains,  
19 from uphill. Which would just make things worse if you  
20 tried to pump it.

21                   There's a third reason you don't want to  
22 use pump and treat out here. That is the unique  
23 nature of this aquifer which will mean if you try to pump  
24 the fresh water, what you will get instead is  
25 what is called geothermal water. Hot water. And you

1       won't be getting vinyl chloride. You'll be getting  
2       hot water. You'll be sending that hot water to your public  
3       waste water facility. On this graph, you can  
4       see that here is the site right here. Small little  
5       area right here. This is the Wasatch Mountains. And  
6       this is the Salt Lake Valley down through here. In  
7       the Salt Lake Valley, there are three bodies of  
8       water, underground bodies of water called aquifers.  
9       There's a shallow one called the shallow aquifer.  
10      You do not use it in the Salt Lake Valley. It's  
11      where the swampy water you see in the valley comes  
12      from. It's not used for drinking water. It would  
13      not be good for drinking water.

14               Beneath that is the principal aquifer,  
15      as it's called here. It's called principal because that's  
16      where most of the water for Salt Lake comes  
17      from. That's your major source of water. It sits in  
18      a body of sand and gravel down here. And this is  
19      where most of the water in Salt Lake for public use comes  
20      from.

21               There's a third aquifer which I'll talk  
22      about in some detail. It's geothermal water. Hot  
23      water. Where does it come from? You have hot  
24      springs all along the Wasatch Front. Most of you who have  
25      lived here all your lives know about that.

1 Clark Springs, Warren Springs so forth along the  
2 fault. What these things are hot water coming up  
3 from deep within the earth. This water is salient.  
4 You don't want to drink it. It's usually too hot to  
5 even bathe in. Very hot.

6 The Ekotek site sits on top of this  
7 geothermal or hot water. In fact, there is only  
8 about 40 to 60 feet of fresh water sitting on top  
9 of this hot water. The fresh water is where the  
10 contamination is. The vinyl chloride is in the fresh  
11 water. It's not in the hot water. The fresh water  
12 that flows into the site comes from two principal sources  
13 The Wasatch Mountains. It flows  
14 downgradient, so to speak, down from the mountains  
15 underneath the site.

16 There's another source of fresh water  
17 beneath Ekotek. And that is from the principal  
18 aquifer. The one where most of your water comes from  
19 in Salt Lake City. The water down here is under pressure.  
20 And it's under greater pressure than the  
21 fresh water beneath Ekotek. What happens? Water  
22 flows from high pressure to low pressure. You've  
23 heard from high to low. Usually from uphill to  
24 downhill. Really, it's from high pressure to low pressure.  
25 This water is under greater pressure than

1 it is underneath the site. So water from the  
2 principal aquifer flows into the site. So you have  
3 converging flow. Flow from the mountains, flow from  
4 the valley. They converge right here.

5 That's why the vinyl chloride plume  
6 isn't moving. It can't go anywhere. It can work its  
7 way down from the mountains, and that is the offsite  
8 source you've heard about. Dr. Bouwer will talk  
9 about that in more detail. So it can come down from  
10 the mountains and come underneath the site, but it  
11 can't go anywhere. Why? Because water from the  
12 principal aquifer is flowing up to meet it. These  
13 two sources of water meet right underneath the site.  
14 The vinyl chloride can't go any where. It's stuck.  
15 It's going to stay there.

16 That's why as Paul Anderson and everyone  
17 preceding me said, the plume isn't moving. It isn't  
18 a threat to anybody right now. It's staying where it  
19 is. That is one of the beneficial aspects of this  
20 site in terms of ground water. We don't have to  
21 rush. We can watch and see what happens with time.  
22 As you'll hear next it is already beginning to  
23 degrade. Vinyl chloride is naturally decreasing in  
24 concentration.

25 You've also seen in Alternative 7 that

1 the EPA would like us to pump the vinyl chloride out. Put  
2 in a well and pump the vinyl chloride out. What  
3 will happen if you do that? If you put the pump in  
4 with this geothermal or hot water right beneath it,  
5 what you're getting is hot water. Not fresh water.  
6 Why? Because what's holding this pressure surface  
7 down right here is this converging flow of two fresh water  
8 bodies.

9               If you start pumping it, you pull that  
10 pressure down. And this geothermal or hot water  
11 comes right up. This happens, for instance, in  
12 coastal regions such as Florida, Hawaii, the East  
13 Coast of the United States, places like Maine, for  
14 instance, and Massachusetts. These areas have fresh water  
15 on top of salt water. They have to get their drinking  
16 water from the fresh water. Nobody wants to drink ocean  
17 water. So they do put wells into that  
18 fresh water in order to have drinking water for  
19 people that live along the shore line.

20              But they have to be careful how they  
21 pump it. If they pump it too hard, it's sea water,  
22 not fresh water. Many of the larger cities on the  
23 East Coast, and especially in Hawaii, have already pumped  
24 too much fresh water. They can't pump any  
25 more. They have to get surface water for their

1 drinking water. They can't use ground water any  
2 more.

3                   What will happen here is if you put in a  
4 pump, even at 40 to 100 gallons a minute, you will  
5 bring geothermal or hot water right up into the pump  
6 and down to your public waste facility. That isn't  
7 what you want to do. That's not going to clean up  
8 the vinyl chloride. It's also going to make cleaning  
9 up the vinyl chloride difficult, if not impossible. These  
10 aren't two floating bodies of water. This  
11 isn't like oil and vinegar. An aquifer is sand.  
12 Sand saturated with water. Sand has pores in it.  
13 Large pores and small pores. When the geothermal or  
14 hot water comes up into that sand part of that  
15 pressure water aquifer, it's going to fill a large  
16 pore. It's going to block off the small pore.  
17 You're not going to get anything out of the small  
18 pores. That means you won't get the vinyl chloride  
19 out. Not only will you be pumping hot water instead  
20 of fresh water, you will not be able to get all the vinyl  
21 chloride out. Your cleanup efficiency will  
22 drop well below 50 percent, maybe below 30, depending  
23 on how much you try to pump.

24                   You've heard pump and treat won't work  
25 because the plume is not going anywhere. There's an

1       offsite source. There's a third reason. I'd like  
2       all of you to understand who live in this area.  
3       Ekotek sits on top of a geothermal reservoir. It  
4       sits on top of hot water from deep in the earth.  
5       If you try to pump the vinyl chloride, you'll wind up  
6       sending hot water to your public treatment facility. Down  
7       your sewer system to your waste facility. And that's the  
8       last thing you want to do.

9               I'd like to turn it to Dr. Ed Bouwer. He'll  
10       explain the chemistry of what's going on and  
11       why the vinyl chloride is naturally decreasing in  
12       concentration.

13              MR. ED BOUWER: I'm Professor Bouwer,  
14       B-O-U-W-E-R, professor of environmental engineering  
15       at Johns Hopkins University in Baltimore, Maryland.  
16       And as Denise mentioned, I've been working in this  
17       area for 16 years. On subsurface and ground water  
18       contamination. And recently I was part of the  
19       committee on the National Research Council that  
20       examined alternatives to ground water cleanup.  
21       Looked at pump and treat, evaluated its merits and  
22       pitfalls as well as made recommendations.

23              Two conclusions from that are pump and  
24       treat is not a very viable remedial strategy,  
25       particularly for chlorinated solvent type



1 contamination. And secondly, that we strongly  
2 endorse technology like intrinsic remediation to help  
3 clean up sites.

4 I was contacted last fall by the  
5 Committee to examine the site, and I essentially  
6 started in October last year like you all started,  
7 looked at it, made recommendations on how to go about  
8 assessing whether or not intrinsic processes were  
9 occurring, and helped interpret the data to make our  
10 final conclusion which we recently submitted an  
11 aquifer characterization report and made  
12 presentations to EPA and others. I want to highlight  
13 what those findings are.

14 First of all, what do we mean by  
15 intrinsic remediation? The aquifer is cleaning  
16 itself up. We found out by examining sites now for  
17 10 or 15 years that several sites, Mother Nature is  
18 doing a pretty good job. Chemicals have been there a  
19 long time, microorganisms there are there are  
20 adapting to the contaminants and contaminants are  
21 being degraded and converted to innocuous and  
22 nontoxic compounds on their own, left to natural  
23 devices. What I want to do is provide you evidence  
24 that we have at the site and how I base my  
25 enthusiastic and positive opinion about intrinsic

1 remediation.

2 First of all, what we've been doing at the  
3 site, we've been characterizing concentration  
4 levels of contaminants in the ground water. This has  
5 been done for several years now. We have data  
6 starting in January of 1993. What we're plotting is  
7 a concentration of the vertical axis in time and the  
8 horizontal axis. We've looked at vinyl chloride in  
9 this particular monitoring well on this site. We  
10 observed a general cleaning trend in the  
11 concentrations of vinyl chloride. This is one well.  
12 Another well. Similar kind of data, concentration  
13 versus timer showing this trend.

14 If we look at the removal, what's  
15 happening is vinyl chloride is being transformed, in  
16 this case to a nontoxic product. This transformation  
17 as a removal process converts vinyl chloride from a  
18 toxic compound itself to a nontoxic final product.  
19 If you look at the rate, how fast it declines, we can  
20 extrapolate that it will take roughly three to five  
21 years to reach the cleanup goals, which are two part  
22 per billion. This particular well seems to be in  
23 that range. Some of the other ranges are getting  
24 close to that. This would suggest natural process  
25 intrinsic remediation, would take three to five years

1 to achieve the removal of the vinyl chloride.

2 Other measurements. We not only look at  
3 the disappearance of the compounds, but we also look  
4 for the right chemistry. We know that these solvents  
5 in order to degrade like the vinyl chloride appears  
6 to be doing, it needs a certain chemistry. That  
7 chemistry turns out to be an aerobic chemistry.  
8 There are aerobic organisms, but there are others  
9 that are anaerobic. They were on this earth before  
10 plants carried out photosynthesis. We have a measure  
11 for that.

12 This blue sort of cloud-like circle  
13 there, what that does is it describes an envelope at  
14 the site in which we have very strong anaerobic  
15 conditions. Very favorable for this transformation  
16 of vinyl chloride. Indeed, the vinyl chloride that  
17 we're speaking of is disappearing in into region  
18 shown by the circle. This other line is a similar  
19 region not quite as anaerobic but fairly anaerobic.  
20 Reactions can occur for degradation. There's an  
21 envelope around the site that has very favorable  
22 chemistry due to natural conditions already there.

23 If we go in and do pump and treat, one  
24 of the main problems, another additional problem in  
25 addition to what Bob Berry and others have already

1 said, when you start pumping, you're going to disrupt  
2 this favorable chemistry. And you will no longer  
3 have the reducing conditions anymore. You'll be  
4 pulling in geothermal water, also pulling in other  
5 water surrounding, and you'll collapse that natural  
6 condition. What's you'll do is disrupt this  
7 favorable natural chemistry, and you will no longer  
8 get effective intrinsic remediation. Pump and treat  
9 itself will disrupt what nature already seems to be  
10 doing quite well at the site.

11 Over the past six months, we have done  
12 more extensive monitoring at the facility. We've  
13 expanded a network of wells that are present. And I  
14 should get Vanna White to walk around the room with  
15 this. The Ekotek site is here. Again we're looking  
16 toward the site boundary. The vinyl chloride has  
17 been detected in this region. That's where I showed  
18 the favorable anaerobic chemistry. What we've  
19 discovered over the last six months by expanding the  
20 monitoring well network, we have an offsite source of  
21 a TCA which is a parent compound for vinyl chloride.

22 It's been puzzling over the past year of  
23 looking at this site, we've never seen an obvious  
24 source for this vinyl chloride. The levels are low,  
25 part in billion range. Very low risk at the site.

1 I've worked at a number of sites, and we find tens of  
2 thousands of higher concentrations. Already the  
3 vinyl chloride is very low. Very manageable risk  
4 exists from that.

5 What source could have caused that vinyl  
6 chloride? We've identified our major source. There  
7 is this trichloroethane, TCA compound that's moving  
8 into the site. What's happening is TCA is being  
9 transformed by these natural processes. What  
10 happens? It gets degraded to vinyl chloride. As  
11 this TCA comes in, it gets transformed to vinyl  
12 chloride. Then we have this vinyl chloride plume.

13 Fortunately, the site chemistry is  
14 favorable and it's handling that vinyl chloride and  
15 we're keeping this plume very tight to the site. Dan  
16 Thornton mentioned the plume is not moving. It  
17 appears to be stable. Therefore, again, intrinsic  
18 remediation seems to be doing the job in terms of  
19 remediating ground water there.

20 I guess the remark is pump and treat --  
21 given this offsite source now, this. pumping will  
22 simply pull more of this in and is not going to clean  
23 up that TCA source. It's going to hamper the pump  
24 and treat activity and will disrupt the natural  
25 processes. And, in fact, the vinyl -- vinyl chloride

1 is being contained. I hope EPA gives intrinsic  
2 remediation a chance before they select pump and  
3 treat for the alternative on this site. Thank you  
4 very much.

5 MS. DENISE KENNEDY: Just in summary, there  
6 are two ways to clean up the site. Both of them meet  
7 all of the EPA requirements for the foregoing reasons  
8 that we've all suggested. The fact that one is more  
9 cost effective than the other. We believe that  
10 Alternative 10 should be selected as the site cleanup  
11 remedy. We're here to talk with people. We're happy  
12 to talk with anybody after the meeting. We're open  
13 and looking forward to talking with the State and EPA  
14 on the remedy. We're committed to a remedy that's  
15 soundly based in technology and science at the site.  
16 Thank you.

17 MS. NANCY MUELLER: Thanks, Denise. Okay.  
18 Mr. Ray? Phil Ray?

19 MR. PHIL RAY: I have no comment at this  
20 time.

21 MS. NANCY MUELLER: Thank you. Mr. Chiaro?

22 MR. PRESTON CHIARO: Preston Chiaro,  
23 C-H-I-A-R-O. I'm the vice president of technical  
24 services for Kennecott Utah Copper Corporation.  
25 We're a member of the Ekotek Site Remediation

1 Committee and have been working with the other people  
2 and companies along with the EPA and State trying to  
3 find a solution to the problem at the site.

4 Like many other small and large  
5 businesses here in Salt Lake we sent used oil to the  
6 Ekotek site with the belief that it would be recycled  
7 responsibly. Unfortunately, that wasn't the case.  
8 And we now have the problem at the site. The former  
9 owners of the site are not available to take care of  
10 the problem, so we're stuck with it.

11 We are -- Kennecott's very familiar with  
12 cleanups of abandoned hazardous waste sites. We're  
13 spending money on the west side of the valley to  
14 clean up mine waste sites. We do want the cleanup  
15 alternative as chosen here to be as affirmative as  
16 possible. We want to protect people and the  
17 environment. We also want it to be cost effective.

18 As Denise said, the parties who sent  
19 materials to the site were following the law at the  
20 time. We didn't do anything irresponsible. We don't  
21 think a punitive remedy is really appropriate in this  
22 situation. I've got several pages of comments which  
23 basically will reiterate and support what the Ekotek  
24 Site Remediation's findings have been. We'll submit  
25 the written comments to the record.

1 I would like to summarize that we do  
2 support Alternative 10 as being the best remedy for  
3 this site. It does meet EPA's requirements. It's a  
4 cost effective remedy as an added bonus. It actually  
5 creates less disruption at the site than EPA's remedy  
6 does. As you heard from the experts that have spoken  
7 tonight, some aspects of EPA's preferred remedy,  
8 preferred approach, actually carry more risks with  
9 them than the Committee's recommended solution. So  
10 that's primarily why we support Alternative 10.

11 We also stand ready to meet with any of  
12 the local citizenry, the Capitol Hill Neighborhood  
13 Council or the TAG group to discuss any of these  
14 issues. We live and work in this area and have our  
15 own workers in this area as well as the people making  
16 the decisions on the site. We have a vested interest  
17 in this area. We want to do the right thing. We  
18 think Alternative 10 is the responsible choice. And  
19 that's what we support.

20 MS. NANCY MUELLER: Thank you. Brad Bowen?

21 MR. BRAD BOWEN: My name is Brad Bowen. I  
22 represent Consolidated Freightways. Consolidated is  
23 also interested in helping clean up this site, but it  
24 wants to emphasize that it did nothing wrong. They  
25 did nothing wrong either. This was a site licensed



1 by the State of Utah, and in fact in some instances,  
2 the State of Utah directed potentially responsible  
3 parties to the site even after the inspectors knew or  
4 should have known the site was being improperly  
5 operated and was operating beyond the scope of its  
6 license. Consolidated feels that it really has been  
7 treated as a wrongdoer despite the substantial  
8 efforts it has undertaken to help remedy the problems  
9 at Ekotek.

10 Consolidated Freightways promptly joined  
11 the Remediation Committee and has expended  
12 substantial funds in helping to clean up the  
13 property. As Denise indicated earlier, \$17 million  
14 has already been spent by this Committee in helping  
15 remedy the problems of this site.

16 I'd like to point out that I believe a  
17 number of the EPA assumptions are really ridiculous.  
18 We're talking about drilling for drinking water and  
19 an aquifer that clearly has not been used for  
20 drinking water. They've ignored the zoning  
21 prohibitions. There already exists a public water  
22 supply. This poses no threat of any kind to any  
23 public drinking water. This isn't an agricultural  
24 area. EPA proposal ignores the geothermal aquifers  
25 and the rain water from the Great Salt Lake. It

1 ignores naturally occurring chemicals in the ground  
2 water on the site. The EPA proposal in fact goes well  
3 beyond EPA's own requirements for site  
4 remediation.

5 EPA acknowledged that Alternative Number  
6 10 meets all of its standards and requirements.  
7 Adoption of an alternative that costs ten and a half  
8 million dollars more than an equally acceptable  
9 solution puts the faculty of these companies and  
10 future jobs at risk.

11 Through the course of the remediation  
12 efforts, including all the studies, research and  
13 information gathered and performed by the Committee,  
14 viewing it as objectively as possible, Consolidated  
15 feels that EPA is acting punitively to members of the  
16 Committee. Even to the extent of taking actions  
17 which substantially undermine the efforts of the  
18 Committee to obtain contributions for the remediation  
19 costs. In many instances, it would have been better  
20 for members of the Committee to have ignored the  
21 EPA's administrative orders and wait in the wings, as many  
22 of the companies did. Those potentially  
23 responsible parties are now being encouraged to  
24 settle with EPA under terms much more favorable than  
25 should be allowed and to ride on the coattails of the

1 actions of this Committee.

2 Consolidated feels EPA's selection of  
3 Alternative 7 is a slap in the face to the  
4 responsible actions of this Committee and is a direct  
5 contradiction to direct policy of the EPA. Not only  
6 has the EPA enacted impossibly high standards, they  
7 have also selected an alternative which goes far  
8 beyond even their own standards at a cost to the  
9 potentially responsible parties of approximately ten  
10 and a half million dollars.

11 As a member of the Committee,  
12 Consolidated is frankly tired of being treated as a  
13 wrongdoer instead of as a responsible corporate  
14 citizen. It's tired of high handedness and expensive  
15 solutions that go beyond reason. Consolidated  
16 objects to the plan proposed by EPA and demands EPA  
17 allow some measure of reasonableness to govern this  
18 site and requests the proposal set forth by the Site  
19 Remediation Committee, mainly Alternative 10, be  
20 accepted.

21 MS. NANCY MUELLER: Thank you. Carolyn  
22 McHugh?

23 MS. CAROLINE MCHUGH: Caroline McHugh, M-C  
24 cap H-U-G-H. I represent EHP Minerals. EHP also  
25 sent used oil to the site to be recycled with the

1 understanding it would be recycled and resold. We  
2 support strongly the Site Remediation Committee's  
3 proposal. We believe that the EPA's proposal ought  
4 to be reconsidered, particularly in light of the  
5 evidence that it may actually exacerbate the problem  
6 on ground water. Thank you.

7 MS. NANCY MUELLER: Thank you. I can't  
8 read this name. H&M Oil?

9 MR. ED MCCASLAND: Yes. That's me. I'm Ed  
10 McCasland. I think the whole damn bunch of you  
11 stinks. By golly, I never seen such a setup of  
12 screwing the little man over. You've just taken  
13 advantage of us, and you've put most of us out of  
14 business. I'm 75 years old. I know damn well  
15 something is going to get me one of these days. But  
16 it hasn't got me yet. I've lived this long and  
17 worked with this oil for lots of years. 20 odd  
18 years. And I cannot feel that it's ever hurt me one  
19 ounce. I mean, you know, just hasn't done it. And I  
20 listen to all these artists -- I don't know what you  
21 call them -- whatever they're called. We've got a  
22 a special name in engineering language. But you talk  
23 to -- talked all this time trying to tell somebody  
24 something. And we, the little men, the laymen, we  
25 don't understand what you're saying. So I personally

1 think that you just wasted our monies, our time, our  
2 efforts, and you broke the hell out of us. Now,  
3 that's the way it is.

4 MS. NANCY MUELLER: Thank you, sir. We  
5 Have another McCasland here?

6 UNIDENTIFIED: No comment at this time.

7 MS. NANCY MUELLER: Thank you. Shane  
8 Smooth?

9 MR. SHANE SMOOT: The name is Shane Smoot,  
10 S-M-O-O-T. I'm vice president with Q Lube that was  
11 previously operated as Quaker State Minute Lube. And  
12 the points that I really want to make tonight really  
13 deal with what H&M Oil has just hit on.

14 Our liability at this site evolved from  
15 eight quick lubes that were operated over a six-year  
16 period of time before Ekotek started bouncing checks  
17 and we pulled out of the site. Our ultimate  
18 liability relative to this site in in the  
19 neighborhood of -- in excess of \$2 million. For  
20 changing oil at eight quick lube facilities. The  
21 unfortunate thing about it is when Superfund was  
22 enacted, it was enacted to protect the service  
23 station dealers, and had EPA acted appropriately in  
24 promulgating management standards, our entire  
25 liability would be exempt. It didn't happen. And

1 now we're talking about a remedy that could cost us  
2 just on the intrinsic bioremediation versus pump and  
3 treat, that could cost our entity \$400,000.

4 And there were several critical points  
5 that were made tonight that I think must be heard by  
6 EPA and the State of Utah. And those are, first of  
7 all, there doesn't appear to be migration of the  
8 plume. Secondly, there's questionable effectiveness  
9 of pumping and treating. Next, the -- there appears to  
10 be an offsite source. And the evidence that  
11 intrinsic bioremediation is going to be more  
12 effective. I do not see any reason why EPA should  
13 not give intrinsic bioremediation an opportunity to  
14 work and test it before we go to the drastically more  
15 expensive and extensively less effective alternative  
16 of pump and treat.

17 I'm concerned. We've had to bite our  
18 tongue on a number of occasions and actually over  
19 the -- over the period of time that I've been  
20 involved with the Committee, and I was in that first  
21 small group that formulated the Committee, and I've  
22 watched this evolve over a number of years, I've  
23 heard all the war stories about Ekotek, and when it  
24 comes right down to it, what we're cleaning up is an  
25 old used oil recycling facility. It's not all of the

1 double X death contaminants that were alluded to  
2 through a lot of the discussions.

3 So my point is merely that I see no down  
4 side to EPA giving intrinsic bioremediation a chance.  
5 The Committee is not proposing that intrinsic  
6 bioremediation be relied upon exclusively and the  
7 Committee walk away. But give it a chance. If it  
8 doesn't work, let's look at other alternatives. But  
9 don't jump to a ten and a half million dollar remedy  
10 that appears to not be the answer to the problem.

11 I do want to commend, however -- I  
12 believe EPA and the State of Utah have made attempts  
13 over the period of time to try and work with the  
14 Committee, and I do not want to be overly critical of  
15 the State of Utah or of EPA. I have not always  
16 agreed with them on their positions. But I think the  
17 Committee has been asked to do a lot of things that  
18 should not have been asked, but nonetheless, we bit  
19 our tongues, we've done what has been required of us,  
20 and given all the evidence on the table, I just can't  
21 see any down side, again, to EPA giving intrinsic  
22 bioremediation a chance. If it doesn't work, that's  
23 fine. We still have the viable parties.

24 But from a small party's perspective,  
25 and you have to remember there are large parties on

1 the Committee., but there are also a lot of small  
2 parties that are being hurt, and hurt significantly.  
3 And as a result, if EPA would consider that, it would  
4 be greatly appreciated, and I think history will bear  
5 out that it will be the right decision. Thank you.

6 MS. NANCY MUELLER: Thank you. Harry  
7 Patterson?

8 MR. HARRY PATTERSON: I'm Harry Patterson.  
9 I'm manager of environmental site remediation for  
10 Union Pacific Railroad. I'm also the technical  
11 committee chairman for the Ekotek Site Remediation  
12 Cleanup.

13 Union Pacific like a number of companies  
14 became involved in this site early on because of our  
15 past use at this site. Union Pacific like other PRPS  
16 sent used oil, in our case locomotive used oil, to  
17 this site for refining. In our case, we took back  
18 this rerefined oil and continued to use it in our  
19 locomotive facility for crank case oil.

20 Union Pacific was not an owner of Ekotek  
21 in any way. We had no influence over their  
22 management of the oil refining, refining process, or  
23 the wastes that did generate.

24 Because Union Pacific sent a large  
25 volume of oil to this site, we have actively



1 participated in this cleanup. Since the late '80s,  
2 through the Committee, we've helped identify, analyze  
3 and remove all the liquids that were left on this  
4 site by the last owners. We've removed some soil,  
5 we've removed the tank farm facility, and we've  
6 completed the RI/FS that's resulted in this draft  
7 record of decision for the site's cleanup.

8           This is -- the Committee has spent over  
9 \$17 million in performing the removals and  
10 investigations with the full direction and input from  
11 the EPA. I believe everyone that has been involved  
12 in this site is aware of the changes that have  
13 occurred at this site over the years. Union Pacific  
14 and the Ekotek Site Remediation Committee have  
15 treated this property in a responsible manner in all  
16 respects.

17           We at Union Pacific and the Committee's  
18 objective is to remediate the site so it's fully  
19 protective of the environment and health of those  
20 living in the area and in a most efficient and cost  
21 effective manner. By EPA's own analysis as you've  
22 heard tonight, Alternatives 7 and 10 meet minimum  
23 requirements to protect human health and the  
24 environment. As you've heard, our experts have --  
25 who have studied this site have concluded that

1 pumping and treating the ground water will be  
2 ineffective because of the complicated ground water  
3 conditions and the adjacent contaminant plume which  
4 we've found to exist near the site.

5 Union Pacific believes Alternative 10  
6 will be the least disruptive and best alternative for  
7 remediating this site. Hazardous hot spots in the  
8 soils will be removed and disposed of offsite.  
9 Remaining oils, contaminated soils which EPA risk  
10 assessment clearly show are not a hazard to anyone  
11 will be sandwiched and contained on the site in a way  
12 that will pose no health risks to anyone working on  
13 the site or anyone living near it.

14 As our experts have reported, risks to  
15 the environment at the Ekotek site are fully  
16 eliminated with Alternative 10 which is estimated to  
17 be at least \$10 million less costly than Alternative  
18 7. The EPA to require more cleanup would be  
19 arbitrary, capricious, and punitive to the companies  
20 that have willingly participated in this site  
21 assessment removal and hopefully an ultimate final  
22 cleanup of the site.

23 We urge everyone, the EPA, the  
24 neighborhood, and the local community to come  
25 together. Let's come together, let us find the cost

1 effective, reasonable alternative, and let's finish  
2 this cleanup. Thank you.

3 MS. NANCY MUELLER: Thank you. That's  
4 everyone that's signed up. Is there anyone else that  
5 would like to make a comment? Sir?

6 MR. JERRY HAYES: Would it be possible to  
7 ask -- Jerry Hayes, president of the Utah Automobile  
8 Dealers' Association, representing 145 dealers, new  
9 car dealers, and truck dealers, in 37 communities in  
10 the State of Utah. And we produce the largest  
11 segment of taxable gross sales in the State of Utah.  
12 \$3 billion. Among the 145 dealers in smaller  
13 communities particularly, they are small businessmen.

14 We have 83 dealers that have been  
15 impacted by this action that we feel is  
16 unconstitutional to charge back somebody on a law  
17 retroactively that has cost our dealers from 50,000  
18 to 85,000 dollars apiece. Now, from what I've heard  
19 here, I'm quite impressed with the presentation that  
20 would save \$10 million for those of us who are  
21 providing funds for this cleanup. Now, may I ask  
22 four questions?

23 MS. NANCY MUELLER: Surely.

24 MR. JERRY HAYES: All right. What is the  
25 difference between waste oil contributors, what they

1 had to pay, and toxic waste contributors? Because  
2 waste oil is not a hazardous waste. Why we are even  
3 named in it is my question. Who can answer it?

4 MS. NANCY MUELLER: Jim, would you like to  
5 try that?

6 MR. JIM STEARNS: Yes, I guess I can. You're  
7 speaking about the de minimis --

8 MR. JERRY HAYES: Yes. Waste oil is not a  
9 hazardous waste.

10 MR. JIM STEARNS: Okay. The substances at  
11 the site that Dan spoke of, the chemicals of  
12 concern -- I'm an attorney. You'll have to  
13 understand the reason I'm responding is because it  
14 relates to the de minimis settlement. Jim Stearns,  
15 I'm sorry. With EPA Region 8.

16 Those chemicals are related to the waste  
17 oil. And EPA performed a toxicity assessment for  
18 purposes of that settlement that determined that  
19 there was no significant difference between the  
20 toxicities from what you're calling solvents and  
21 those same chemicals that occur in waste oil. There  
22 are PAH compounds and so on. And essentially, it's a  
23 soup, you know. That's really what we concluded that  
24 we would not -- it was not justified to charge in the  
25 settlement. For settlement purposes we didn't feel

1     that it was justified to charge solvent contributors  
2     more than waste oil contributors. Based on the  
3     toxicity ratings for each of the constituents of  
4     waste oil and the types of solvents sent to the site.

5             MR. JERRY HAYES: Do you really believe  
6     that to be so?

7             MR. JIM STEARNS: I do.

8             MR. JERRY HAYES: When they have declared  
9     waste oil to be nonhazardous?

10            MR. JIM STEARNS: Okay. EPA -- that's  
11     another aspect. Well, there is a court case that the  
12     Committee has been involved with as you know that  
13     waste oil-- that issue came up. That issue was  
14     litigated in court. EPA did make a determination  
15     that waste oil would not be regulated under RCRA,  
16     which is another statute, Resource Conservation  
17     Recovery Act. That's the cradle to grave statute  
18     that regulates ongoing management treatment, storage  
19     disposal of substances like waste oil. But that  
20     determination is not a determination that there is no  
21     risk from waste oil. And the Superfund process goes  
22     through a whole risk assessment based on the  
23     chemicals that were found at the site. That's what  
24     we're moving ahead on.

25            MR. JERRY HAYES: So everybody paid the

1 same, whether it was oil or highly toxic chemicals?

2 MR. JIM STEARNS: Right. We did not want  
3 to make the determination -- because --

4 MR. JERRY HAYES: And you feel that is  
5 reasonable?

6 MR. JIM STEARNS: I do.

7 MR. JERRY HAYES: Or what should be done is  
8 it isn't the degree of toxicity or hazard to the  
9 community. Everyone's treated equally on this?

10 MR. JIM STEARNS: Yes.

11 MR. JERRY HAYES: Okay. What's the  
12 advantage or disadvantage of settling with the PRP or  
13 the EPA? You have a choice of doing either one.  
14 What's the up side and down side of both of these?

15 MR. JIM STEARNS: All right. Again --

16 MR. JERRY HAYES: Can anybody answer? I'm  
17 waiting for an answer.

18 MR. JIM STEARNS: I can answer that. I  
19 spoke to -- EPA put out a de minimis settlement. The  
20 Committee also put out their settlement. It's a  
21 complicated story. Because CERCLA is a broad base  
22 statute. And it has a okay. What was the  
23 question again?

24 MR. TERRY HAYES: Some of my --

25 MR. JIM STEARNS: The advantages of

1 settling?

2 MR. JERRY HAYES: Half of the 83 dealers  
3 settled with the PRP and half settled -- I shouldn't  
4 say half. Some of them haven't settled. Some of  
5 them are so upset and mad about it, they're just  
6 saying, "Jump in the lake. Do what you have to do  
7 it. I'm not going to pay for anything that I wasn't  
8 responsible for years and years and years ago."

9 MR. JIM STEARNS: I understand that.

10 MR. JERRY-HAYES: Okay. So that's --  
11 that's a diversion. Why should they settle with PRP  
12 or why should they settle with EPA? What's the up  
13 side or down side of settling?

14 MR. JIM STEARNS: EPA -- the government  
15 offers you -- it's a direct covenant not to sue. We  
16 cannot go after you directly for your liability at a  
17 Superfund site. If you settle with the Committee,  
18 potentially you still have some exposure from the  
19 government. But we have gone on record at this site  
20 saying that we would not -- if you settle with the  
21 Committee, we would not be coming after you.

22 MR. JERRY HAYES: That doesn't make sense.

23 MR. JIM STEARNS: Yes, I know.

24 MR. JERRY HAYES: You said if you settle  
25 with EPA, then you would be settled with government.

1 Then you said if you settle with PRP, then they could  
2 still go back and make you settle with the  
3 government.

4 MR. JIM STEARNS: If you settle with the  
5 Committee, you do not have a release from the  
6 government. You only have a release from the  
7 Committee. If you settle with the government, you  
8 also get contribution protection under the statute.  
9 If you resolved your liability to the United States  
10 government at this site, you would -- the law  
11 provides for a contribution protection that is  
12 intended to protect you from a private contribution  
13 suit. Such as the Committee. So their settlement  
14 would not offer similar protection from the  
15 government. You're only resolving your liability to  
16 vis-a-vis the cost recovery suit --

17 MS. DENISE KENNEDY: To further complicate,  
18 have EPA permission to add all of the parties that  
19 settle with us to each of the administrative orders  
20 and preparation the consent decree. So it's a back  
21 doorway of getting the same protection.

22 MR. JERRY HAYES: Because I've had my  
23 dealers say, "Which way shall I go? What's the up  
24 side and down side? A it's such a confused mess  
25 that I --



1 MS. DENISE KENNEDY: I think the easy  
2 answer is your settlement is closed.

3 MR. JIM STEARNS: We have closed our  
4 settlements now. We did a de minimis effort that  
5 lasted about two years. We had several waves of  
6 settlements. We've pretty much ended it.

7 MR. JERRY HAYES: I had a call last week  
8 from one that sold out in 1986. If you don't think  
9 he was upset. If the cleanup costs are less than  
10 budgeted, will there be a refund?

11 MR. ED MCCASLAND: Hell, no.

12 MR. JERRY HAYES: Thank you. Is that the  
13 answer?

14 MR. ED MCCASLAND: That's the answer. It  
15 would be mine. I don't know who got another one.  
16 You ain't getting nothing back from the damn  
17 government or nobody else. The Committee, all of  
18 them got you.

19 MS. DENISE KENNEDY: The settlements don't  
20 provide for a refund.

21 MR. JERRY HAYES: Can anybody answer that?  
22 How about the smart ones here?

23 UNIDENTIFIED: We're not involved. We're  
24 not lawyers. This is lawyer stuff.

25 MR. JERRY HAYES: These are very simple

1 questions. That don't seem to really have an answer.

2 MR. JIM STEARNS: Well, if I can try to  
3 respond? EPA has a national initiative to try to do  
4 de minimis settlements at the Superfund sites. What  
5 that means is a lot of sites have -- involve a lot of  
6 small contributors like yourselves. This was a very  
7 typical example of that.

8 The de minimis settlement from EPA's  
9 standpoint is designed to try to get people out early  
10 so that they aren't dragged through the whole  
11 process. They have an option -- in that sense, it's  
12 voluntary -- to get out early based on early  
13 estimates of the site cost. In order to save  
14 parties, small contributors, small businesses, the  
15 transaction costs of continuing to be dragged through  
16 the process for years and years and years.

17 We have -- Congress provided a section  
18 of the law that encourages EPA to do early de minimis  
19 settlements. And the way we do that is to estimate.  
20 We base our settlement amount on an estimate of site  
21 cost. But we can only do it with the information  
22 that's present at that time. We based our settlement  
23 in this site, we based it on information and  
24 projections that we had based on information that we  
25 had available to us about a year and a half ago.

1 November, that's when we first started this. And at  
2 that point, I think it was early in the data  
3 gathering stage. We had the information some of the  
4 samples -- all the information indicated to us that  
5 the remedy that was necessary would cost in the  
6 neighborhood of some \$57 million. We used that  
7 coupled with about 10 or \$12 million of past costs  
8 for removal. That led us to the determination of  
9 \$69 million as the basis for the de minimis  
10 settlement. You recall that figure.

11 Okay. This is a highly unusual site in  
12 that now it seems after six seasons of continuous  
13 data gathering, it seems that something that we could  
14 have not predicted back then, that the data now  
15 appears to be less, you know.

16 MR. JERRY HAYES: Great. So who gets the  
17 overage?

18 MR. JIM STEARNS: For whatever reason.  
19 This is a highly unusual site in that regard.  
20 Nationwide, most times the costs shoot up.

21 MR. JERRY HAYES: Do the attorneys get the  
22 overage? Quickly, two other questions.

23 MR. JIM STEARNS: I'm an government salary  
24 myself.

25 MR. JERRY HAYES: Who owns the site? Who?

1 MS. DENISE KENNEDY: It's a good question.  
2 There have been three bankruptcies related to the  
3 site. Everybody keeps abandoning the property.

4 MR. JERRY HAYES: When it's all over, who  
5 will own this site?

6 MS. DENISE KENNEDY: Probably the bank.

7 MR. JERRY HAYES: Which bank?

8 MS. DENISE KENNEDY: I don't know the name.

9 MR. JERRY HAYES: Anybody know who's going  
10 to own it?

11 UNIDENTIFIED: Nobody wants it.

12 MR. JERRY HAYES: Shane, do you know who  
13 will?

14 MR. SHANE SMOOT: One of the liens was.  
15 Commercial Leasing, wasn't it? Yes. I'd have to go  
16 back through the records. There were a couple of  
17 liens on the property. But obviously, they don't  
18 want to foreclose on the property, take possession,  
19 and then participate in the liability. So they're  
20 kind of sitting out there. If in fact we end up with  
21 a clean site, then maybe they'll foreclose. I don't  
22 know. Most of them appear just to -- I don't know.  
23 It may escape the -- go to the State ultimately.

24 MR. JERRY HAYES: The last one is, the man  
25 that caused all the problems, I understand is living

1 in California in a big huge home with a four or five  
2 car garage and four or five cars and swimming pools.  
3 What has happened to him to pay the price everybody  
4 else is paying that he should have paid?

5 MR. J.D. KEETLEY: I'll take that answer.  
6 What happened was the State did prosecute. Steven  
7 Self is the fellow you're referring to. He was  
8 president of Ekotek. Then Steven Miller who was the  
9 vice president. They were basically the two owners  
10 of Ekotek for that 10 or 20 year period.

11 What happened was in 1990, during the  
12 emergency removal activity, the U.S. Justice  
13 Department came and they started prosecution  
14 proceedings against those two fellows. And they came  
15 up with altogether a 12 count indictment against  
16 Steven Self. That started happening in 1990. That  
17 was the first environmental crime prosecuted in Utah  
18 and one of the first ones in the United States. The  
19 outcome was they started with 12 indictments, they  
20 found him guilty on six.

21 MR. ED MCCASLAVD: Eight.

22 MR. J.D. KEETLEY: He got --

23 MR. ED MCTASLAND: Eight of them, by God.  
24 I sat through 16 days of it.

25 MR. J.D. KEETLEY: He eventually -- through

1 his lawyers or whatever, he got that struck down to I  
2 think being found guilty on -- four of them were  
3 later overturned. Ultimately, there were two counts  
4 of indictment for like mishandling of wastes and  
5 trying to cover up what he had done. He was  
6 ultimately found guilty on two. I don't think he  
7 ever served any jail time. I think what happened was  
8 he did some community hours in lieu of jail time. He  
9 may have paid a fine, but what he said was he had --  
10 he himself and his business declared bankruptcy. So  
11 he was not at that point, right, legally liable he  
12 wouldn't be liable anymore for any more costs.

13           You're right. He lives in California  
14 around San Diego somewhere. I think the way the  
15 state law is, state by state law, the way they work  
16 out is that you can -- depending on the state you're  
17 in, and California is one of those states, you can  
18 maintain a house and a certain amount of liquidity --  
19 of assets in your name and still declare bankruptcy,  
20 and those are off limits from any kind of lawsuits  
21 like what we're facing. He didn't go to jail. He  
22 paid a little bit of money, but he still has a home  
23 and still had a air amount of money. And yes, he  
24 got off. That's one of those things where if you do  
25 the right thing, if you know the right people -- he

1 more or less got off.

2 MS. DENISE KENNEDY: There is a pending  
3 unilateral EPA order against him to participate in  
4 cleanup of the site which EPA has never enforced.  
5 That was issued by EPA back in '89, and nothing has  
6 happened since.

7 MR. JIM STEARNS: We are maintaining -- we  
8 are looking at that as possibly continuing his  
9 liability of the site. In spite of the bankruptcy.  
10 Bankruptcy is hard to get around.

11 MR. JERRY HAYES: That's all. Thank you  
12 for your --

13 MR. ED MCCASLAND: I have one comment I  
14 would like to add. Steve Self lives at Holbrook,  
15 California. Lived down from as far from me to you  
16 from the Mexican border. If it gets too hot, he  
17 runs. He's done in more than once. The house is  
18 worth over half a million dollars. 4,000 square  
19 feet. He drives three automobiles. One of them is  
20 a -- a Jaguar, yes. Jaguar. And these are all  
21 within the home. Three or four car garage there.  
22 All of this. And the State of California says you  
23 can go to 50,000 bucks. Not no half a million  
24 dollars. For a home. So is that where the money  
25 went? I don't know. Nobody ever said a darn thing

1 about it. Just sits there and keeps living there.  
2 Living on my and your funds.

3 MS. NANCY MUELLER: Any further comment,  
4 questions? Karen?

5 MS. KAREN SILVER: My name is Karen Silver  
6 from Salt Lake Community Action Program. And I did  
7 have some questions. It was helpful to hear the  
8 information first. Most of these are for Dr. Bouwer.  
9 How will the LNAPL removal affect the anaerobic  
10 balance that you're counting on for this remediation?

11 MR. ED BOUWER: That's a good question. We  
12 don't know exactly. There's several scenarios that  
13 could happen. The source for the anaerobic water  
14 geothermal activity, creating anaerobic conditions.  
15 It could be removal of the LNAPL may also disrupt  
16 that as well. What will happen is not the short-term  
17 but a lot of reducing conditions there, it will take  
18 a while to adjust. If this offsite TCA is not  
19 addressed and we continually have this source, that  
20 could disrupt that natural remediation. So it  
21 really -- we need to look more at the offsite site  
22 now for the vinyl chloride before you make any  
23 decisions about long-term potential.

24 MS. KAREN SILVER: Okay. And I was reading  
25 up at the University library in the public document



1 stuff, and there was a March 14th, 1995 letter from  
2 Dr. Hutchins at the Kerr Lab to Sarah Black. And it  
3 said that the method that you suggested in your  
4 research for this bioremediation, that it hadn't been  
5 published and that it may have been designed for  
6 aerobic rather than anaerobic degradation. Can you  
7 address that?

8 MR. DAN THORNTON: That's more appropriate  
9 for the EPA to address. We've discussed this. Sarah  
10 came to me and asked, "What is this document? I've  
11 never seen it." We've identified -- there is not  
12 the letter from Dr. Hutchins on that date to Sarah  
13 which you're referring to is a document that Sarah  
14 sent to me. In that letter, she quoted a statement  
15 is from Dr. Hutchins at Kerr Labs -- they're one of our  
16 labs that produce data for the EPA -- in which he was  
17 talking about the possibility of doing a tracer study  
18 on this aquifer, which is something that we have  
19 maintained is needed to support the possibility of  
20 intrinsic remediation. And he was talking about the  
21 technical feasibility of the specific test. And I  
22 believe Sarah and I are going to spend a good bit of  
23 time later on now working through exactly what he was  
24 saying. I'm not sure from the nature of what she  
25 said in the letter what exactly he was talking about.

1 But we are going to pursue that further.

2 MR. ED BOUWER: I know what he's talking  
3 about. Okay. The tracer study involved taking water  
4 from the site, pumping it out, and adding a tracer,  
5 pumping it back down. The -- Professor Bouwer,  
6 B-O-U-W-E-R. Another line of evidence that you can  
7 try to do to document intrinsic remediation is if you  
8 can compare loss of like vinyl chloride which is  
9 degrading to a chemical that doesn't degrade, which  
10 is bromide or some other tracer, that you add. Then  
11 you have more comparable studies where reactions are  
12 occurring. There's no natural bromide or natural  
13 tracer at the site.

14 One proposal was to pump up the water at  
15 the site, add bromide and pump it back down and  
16 follow the movement of the vinyl chloride and the  
17 bromide together. And we asked the people at Kerr  
18 Lab what they thought about this technique. And  
19 nothing had been published on this. And the concern  
20 that Dr. Hutchins had is when we bring it up, it's  
21 difficult to keep things anaerobic above ground, and  
22 when you have oxygen introduced, you get a false  
23 reading. You've disrupted the system. It's  
24 essentially impossible to conduct a good tracer study  
25 at the site and not disrupt the anaerobic conditions

1       that exist.

2               MS. KAREN SILVER:   Okay. Thanks. I  
3       understood from an earlier presentation that there  
4       are spikes or bullets of TCA coming into the site  
5       which are also from that offsite source. But I don't  
6       see with what -- with my very limited knowledge of  
7       water and stuff, I don't see how those bullets fit  
8       with how fast that vinyl chloride is dissipating or  
9       whatever, or bioremediating, whatever is happening to  
10      it. It seems to me that if the purported industry is  
11      maintaining levels of production at constant rates --  
12      which it looks like it is because it's doing a rate  
13      job killing off the mountain. But anyway, that the  
14      TCA bullets would keep remaining more constant. And  
15      you wouldn't have that much vinyl chloride going  
16      wherever it's going.

17             MR. ED BOUWER:   What we do see, actually,  
18      at some wells, spikes now increase it. There have  
19      been increases that contribute to this new source.  
20      Up until December, we did not see any TCA of this  
21      other source. What we think is happening, and Bob  
22      Berry can comment, the past few years you've had a  
23      drought, more or less. Ground water levels have  
24      declined. What we think is happening, the wet spring  
25      has pushed ground water from the mountains, and

1     that's where the TCA is coming in. What we  
2     hypothesize or think is happening is that there's a  
3     sloshing action. You get periodic pulses of solvent  
4     in. And so the time scale of that may be years from  
5     that pulsing. You get a slug in of TCA degrading to  
6     vinyl chloride, vinyl chloride is disappearing at its  
7     rate, and then another slug comes in, then you get a  
8     spike of vinyl chloride going down.

9             That's what I mentioned earlier. We  
10    need to characterize TCA better. We know it's a  
11    major source of -- can be a major source of vinyl  
12    chloride in the area. Fortunately the ground water  
13    is stagnant, it's contained, and the natural  
14    processes are at least containing the vinyl chloride  
15    aspect.

16            MS. KAREN SILVER: Thanks. I have two more  
17    questions. Let see. The first one is it affects --  
18    it would affect both the scenarios, Alternative 7 and  
19    Alternative 10, I believe. How will the wet and the  
20    dry times impact either of those ground water  
21    remediation plans? Has that been looked at?

22            MS. NANCY MUELLER: Can you answer that for  
23    Alternative 7?

24            MR. DAN THORNTON: Based on our current  
25    understanding, there may be some changes in the

1     aquifer characteristics. I mean, whether we have  
2     these -- as Dr. Berry was showing before, there's  
3     ground water that comes up from the lower formation,  
4     we believe. There may be some variability in where  
5     these plumes are located. We're not entirely sure of  
6     that at this point. But we're looking into the  
7     possibility that the data shows some minor  
8     variations. I don't think that in either scenario  
9     that it would be such a major disruption that we  
10    would have to change the way we were going about  
11    affecting the cleanup. But if we did see something  
12    like that, you know, certainly we would be monitoring  
13    the water as it was being extracted or even in the  
14    case of intrinsic remediation, they talked about  
15    doing ongoing monitoring to see what's happening. If  
16    we saw changes, then certainly we would consider the  
17    alternatives.

18           MS. KAREN SILVER:   Okay. Thanks. The last  
19    question is for the Committee. It seems to me if --  
20    maybe I'm just not clear on Alternative 10, but what  
21    you're saying about putting the clean soil at the  
22    water level and then making the sandwich with the  
23    crummier soil and then putting clean soil on top of  
24    it, it seems to me you're going to have to excavate  
25    all that soil out, dump it somewhere, bring in clean

1 soil, certify that it's clean soil, and then dump the  
2 crummier soil on, and then bring in another load of  
3 the certified clean soil? Is that the idea?

4 MS. DENISE KENNEDY: Yes.

5 MS. KAREN SILVER: Thank you.

6 MS. DENISE KENNEDY: There are areas on the  
7 site --

8 MR. ED MCCASLAND: What are you going to do  
9 with the waste material you take out of the hole,  
10 dammit? Oh-oh. The dirt that you take out of the  
11 hole, what are you going to do with it?

12 MR. DAN THORNTON: I can address that.  
13 Actually, the hole is where the tank farm was. And  
14 we're talking -- I showed everyone before a map of  
15 the site when these things overlap. There is  
16 apparently a fairly thick layer of clean soil where  
17 there isn't any contamination. And the location for  
18 Alternative 10 that we considered where we were going  
19 to consolidate all these contaminated soils is not  
20 the same as where we're talking about finding a plume  
21 of oily liquid waste, for example. We're not talking  
22 about extracting those and just -- we don't know what  
23 we're going to do.

24 We're looking at a different area on the  
25 site. It would probably help if I had a map

1 available so I could kind of show you. This at least  
2 looks the clearest, although it isn't necessarily the  
3 biggest map we have. On the eastern portion of the  
4 site, generally speaking, we're looking at ground  
5 water contamination and the soily liquid waste that  
6 got down there on top of the ground water. It's  
7 generally in this area. More to the north, I guess.  
8 Okay? The area that we're talking about  
9 consolidating this stuff is the former tank farming  
10 area. So if there were excavations that took some of  
11 those wastes out, those would be treated as the  
12 alternative set. Either by landfilling or some kind  
13 of offsite treatment technology. Just going to be  
14 taken out. And then with what's left, we're going to  
15 be consolidating the other soils, especially from  
16 this -- the western portion and whatever else is here  
17 into that area. So part of it overlaps. The debris  
18 area that's showing up -- there's going to be  
19 demolition of buildings, because the buildings may  
20 overlap that debris area. To get at it, we're  
21 probably going to have to take out a few more things.

22 These are all -- that feasibility study  
23 looks, very clearly at some of these other things that  
24 we're not mentioning here. Like underground storage  
25 tanks that are onsite that are going to be removed.

1     There are details like these building demolitions.  
2     That's all costed in. But we're trying to avoid the  
3     fine print here and just give you a broader picture  
4     of what we're trying to accomplish.

5             MR. ED MCCASLAND:   That fine print is where  
6     you'll get us.

7             MR. JERRY HAYES:   Who makes the decision  
8     whether or not we go with Plan 7 and \$10 million or  
9     go with Plan 10 and spend the full shot? Is it the  
10    EPA's decision? Are they going to listen to these  
11    people? What's going to happen? What good is the  
12    hearing? What's the results of this?

13            MS. NANCY MUELLER:   You're helping make the  
14    decision. The comments that were made tonight as  
15    well as the written comments that we'll be getting,  
16    each one will be considered by EPA and addressed in  
17    what's called a responsiveness summary which becomes  
18    part of the record of decision for the site. Which  
19    is EPA's document that says this is what we've  
20    decided is the best. Based on comments, pro, con,  
21    whatever. We've decided that this is the best.  
22    That's the main purpose to have a meeting like this  
23    and to have a public comment period, to bring this  
24    information together to give the people that are most  
25    affected by what our decision is going to be, to give



1     you a chance to give us your input.

2                 There are certain scientific things that  
3     we have to consider that -- it's EPA's job to  
4     consider the scientific side. But there's a lot of  
5     other community concerns. And so you are helping  
6     make the decision. Yes, it is ultimately EPA's. But  
7     we are very committed to listening to public comment  
8     and incorporating that comment into our decisions.

9                 MR. J.D. KEETLEY: I'd like to say one  
10    thing in closing. We're wrapping this up. To just  
11    address the main issue that probably brought 95  
12    percent of you here as far as who pays for the site  
13    cleanup, I like to look at this whole process using  
14    an analogy of getting a driver's license. Sure, the  
15    State has been brought up before the State was  
16    overseeing what happened out there at Ekotek. And  
17    things got out of control out there back in the '70s  
18    and '80s. They got permission from the State, truly,  
19    to operate some of their operations. Permitted by  
20    State.

21                But I make the analogy, I look at this  
22    as going out and getting a driver's license. You're  
23    getting permission from the State to drive a car, but  
24    the State's not obligated for whatever you do. It's  
25    your responsibility. Hopefully, you have insurance

1 to cover whatever you do. The State just gives you  
2 the permission to operate a motor vehicle. That's  
3 where their liability ends.

4 That's what happened the at the Ekotek  
5 site. The State gave limited permission for them to  
6 carry on some of they are operations. Things got out  
7 of control. There's always going to be law breakers.  
8 We don't want a police state with police checking up  
9 on what everybody does so it inhibits our freedom.  
10 It got out of control. That was definitely a  
11 regrettable situation.

12 Given that that occurred, as far as who  
13 cleans up for the site, I also think it's -- there's  
14 a lot of -- I heard your comment as far as it is  
15 hurting the little guy quite a bit. And I think  
16 that's also a regrettable situation. It's part of  
17 the Superfund law. And I don't -- I also heard  
18 somebody mention the term wrongdoer. I don't think  
19 any of the agencies here are looking at anybody as a  
20 wrongdoer. It's just the way that the law, the  
21 liability law, is set up that if you were a generator  
22 or transporter of wastes and you brought it to a site  
23 like Ekotek and something happens like what happened  
24 at Ekotek, you become responsible for it, the  
25 payment. It's regrettable especially when it falls

1 on the shoulders of people that don't have that much  
2 money.

3 But going back to the analogy of  
4 driving, operating a motor vehicle, it's like  
5 insurance. once again, that's the law. That's the  
6 way the laws in this country are set up. It always  
7 falls on the people that obey the law. All the laws  
8 of this country fall on the shoulders of the people  
9 that obey the law. It's unfortunate. I can't do  
10 anything about it. Nobody here can do anything about  
11 it. Some modifications to the overall program can be  
12 made. I agree with you sympathetically. It's a  
13 pretty regrettable situation. But I don't know what  
14 alternatives there are going to be.

15 I will say that this meeting tonight in  
16 regards to the proposed plan, it's not written in  
17 stone. So what might happen in the future, it's not  
18 written in stone. Things can change. I can't  
19 predict what will be the outcome by the time the ROD  
20 is signed several months down the road. I will say  
21 comments like yours kind of help give us direction as far  
22 as what to do, which way to go.

23 And also as far as your comment about  
24 things seem to go over your head, believe me, a lot  
25 of this stuff goes over a lot of our heads. Goes

1 over my head. I'll tell you why these discussions  
2 are so technical is because there's \$10 million.  
3 This probably is going to either cost \$6 million or  
4 \$16 million. There's a lot of -- people are willing  
5 to get very technical and very legalistic to save 10  
6 million bucks. That's pretty -- I would be, too. So  
7 don't -- that's just the way it goes. Even if it  
8 goes over your head, it's going over a lot of  
9 people's heads. There's going to be a decision out  
10 of this, and it's going to be \$10 million one way or  
11 the other. That's the bottom line as far as why  
12 things have gotten to the point they've gotten. why  
13 they've gotten so technical.

14 MS. NANCY MUELLER: Thanks. Anything else?

15 MS. DENISE KENNEDY: I want to respond to  
16 the driver's license analogy briefly. What we're  
17 talking about is that \$10 million. We don't want to  
18 be punished by paying \$10 million more to clean up  
19 this site than we need to.

20 MS. CAROLINE MCHUGH: I want to respond to  
21 your driver's license analogy. You license a taxi  
22 driver. I hire the taxi driver to take me across  
23 town. The taxi driver runs into this gentleman, and  
24 the State orders me and the federal government orders  
25 me, the passenger, to pay for his injuries. That's

1 CERCLA under your analogy.

2 MR. ED MCCASLAND: I think you ought to get  
3 your hand out of your pocket and let's go home.

4 MS. NANCY MUELLER: Thank you all for  
5 coming.

6 (Whereupon the proceedings were  
7 concluded at 9:35 p.m.)  
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1 STATE OF UTAH )  
2 ) SS.  
3 COUNTY OF SALT LAKE )

4 I, MARY D. QUINN, Certified Shorthand Reporter,  
5 Registered Professional Reporter and Notary Public  
6 in and for the State of Utah certify:

7 That the foregoing hearing was taken before  
8 me at the time and place therein set forth;

9 That the statements and comments made at the  
10 time of said hearing were recorded stenographically  
11 by me and were thereafter transcribed;

12 That the foregoing transcript is a record of  
13 the hearing and statements made at the time of said  
14 hearing.

15 I FURTHER CERTIFY that I am neither counsel for  
16 nor related to any party to said action nor in  
17 anywise interested in the outcome thereof.

18 IN WITNESS WHEREOF I have subscribed my name and  
19 affixed my seal this 31st day of July,  
20 1995.



21 MARY D. QUINN CSR, RPR  
22 My Commission Expires 1/9/98  
23  
24  
25

MARY D. QUINN CSR, RPR  
(801) 328-1188

**13.2 Response to  
Comments on the  
Proposed Plan for Petrochem/Ekotek  
Superfund Site  
July 1995**

**13.2.1 EPA's Response to Comments from the Capitol Hill  
Neighborhood Council, Katharine Hunt, Vice-Chair**

**1) Comment**

1. Capitol Hill Neighborhood Council (CHNC) strongly recommends that EPA select cleanup Alternative 6 at the Petrochem/Ekotek site. CHNC has spent considerable time in discussions at the full council level as well as numerous committee meetings to thoroughly examine the alternatives described in the FS as well as consider possible modifications to those alternatives. We have requested two extensions of the public comment period in order to fully explore all of the options and be sure that our position on the cleanup was sound and considerate of as many views as possible from within the council. We do appreciate EPA's sensitivity to the community's need for additional time and thank the agency for granting the requested extensions.

**Response**

EPA values the participation of the Capitol Hill Neighborhood Council and has extended the public comment deadline twice to allow adequate time for review of the Proposed Plan and preparation of comments.

**2) Comment**

2. Swede Town residents are always foremost in the council's consideration when examining the effects of the site, both past and future. These are the people who have endured the brunt of illegal burns and associated airborne toxins, the illegal spills, which often made their way into the public access of North Chicago Street. Accounts of shoes being "dissolved" by stepping in these spills have been recounted by members of the CHNC Ekotek Committee. Living with the unknown of how the site and its illegal pollution has effected these residents and their children has caused great mental anguish.

Frustration after frustration in early encounters by Swede Town residents with local regulatory authorities are documented. If the early warnings provided by the local residents had been heeded, it is likely that the site would never have progressed to the point of requiring listing as a superfund site. These residents have suffered the ill effects and are looking for some sense of restitution for past blatant disregard for their astute and early recognition of the ongoing environmental degradation

while the regulatory authorities looked the other way.

The "costs" of the human suffering, both physical and psychological from past operations will remain unknown and unquantifiable. The remedy selected by the EPA will have an effect on the community now and in the future. A more aggressive cleanup at the site will relieve some of the psychological anxiety of how the remaining toxins might effect the residents and their children. Technical arguments about low toxicity levels at the site by the current governmental agencies and the TAG advisor carry varying amounts of credibility in the minds of the community residents. The residents relied upon the judgement of "knowledgeable" regulators in the early eighties when they voiced their concerns about the operations at the site. How ironic that the early warnings from the technically unknowledgeable community, if heeded, could have saved society millions of dollars. Society owes Swede Town residents a thorough cleanup. Selection of an alternative with cost savings as a motivating criteria, flies in the face of the residents who attempted to nip the problem in the bud. It is impossible to associate a cost of the "human" effect, but there is one. CHNC encourages EPA to consider these "costs" in evaluation of the alternatives.

## **Response**

Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) states that the selected remedy shall be consistent with the National Contingency Plan (NCP) and be cost-effective. In evaluating the cost effectiveness of proposed alternative remedial action, the short-and long-term costs of such action, including the costs of operation and maintenance for the entire period during which the activities will be required is taken into account. The NCP states that EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat. The selection of alternative 10 as the selected remedy meets the requirements of CERCLA and is consistent with the expectations cited in the NCP. The light non-aqueous phase liquids (LNAPL) or "oily liquids", which EPA believes is the source of contamination to the ground water, will be excavated and treated off-site via incineration. The ground water will be addressed through bioremediation/attenuation. All soils exceeding the soil hot spot criteria will be excavated and disposed off-site. The remaining soils are within EPA's acceptable risk range for the reasonable maximum exposure of an industrial worker. These soils will be buried underneath a 42 inch clean soil cap so that no exposure to any one entering the site can occur. This alternative is as protective to the local residents as any of the other alternatives considered; however, this alternative is considerably less expensive. Alternative 10 costs \$6.1. million while alternatives 6 and 7 cost \$14.2 and



\$16.6 million, respectively. Thus for the same level of protectiveness, alternative 10 is much more cost-effective than alternatives 6 and 7.

### **3) Comment**

3. Alternative 6 ground water remedy calls for intrinsic remediation. Intrinsic remediation, as proposed in the FS, is not adequate to address all of our concerns (see Technical comments below). CHNC feels this alternative will provide adequate immediate protection of the resource and pump and treat, as proposed may not be effective. We would like to continue to work with EPA and the PRPs to strengthen this ground water remedy to insure immediate control of the contaminated ground water plume and strong verification that natural attenuation of contaminants concentrations associated with, the site are a reality.

### **Response**

The selected remedy, alternative 10, requires that the potentially responsible parties (PRPs) performing the Remedial Design/Response Action (RD/RA) conduct studies to quantify the rate of degradation of vinyl chloride to ethane and ethene to demonstrate the existence of and rates of bioremediation. This and other features of the remedy will ensure immediate control and strong verification that bioremediation/natural attenuation is a reality.

### **4) Comment**

4. We feel Alternative 6 ranks highest compared to the other alternatives with respect to EPA's nine criteria for evaluation of FS alternatives.

#### **1) Overall protection of human health and environment**

Alternative 6 cleans up all of the soils contaminated to  $10^{-6}$  and higher. This can only be viewed as ranking higher at meeting this criteria than alternatives that leave contaminated soils between  $10^{-4}$  and  $10^{-6}$  on site.

The policy that no present pathway for toxins to reach a receptor equates to no risk is flawed. Toxins left in the soils in the shallow subsurface continue to have risk associated with them. Certainly we acknowledge that a tanker truck filled with gasoline and driving down the street has potential risk associated with it. The gasoline is sealed off from potential receptors, but the potential for a collision or future leak in the tank exists through the dimension of time (until the tanker is empty). We view the same argument as

applicable to the site subsurface soils. There will be potential for these subsurface soils to be excavated in the future because of the land use for the site or from surface fault rupture associated with the Warm Springs/Hobo Springs faults. Granted these may be relatively low risks, but to assign no risk to contaminated soils left on-site is a flaw in the risk analysis. If there was no risk then there should also be a release of liability for the remaining subsurface soils. This is not the case, and therefore, we believe EPA must consider the diminished overall protection to human health and the environment by allowing contaminated soil to remain on site, even if it is buried.

## 2) Compliance with ARARs

Alternative 6 complies with the identified ARARs for the site as per the FS.

## 3) Long-term effectiveness and permanence

Alternative 6 soils treatment provides long-term effectiveness. The soils will be clean after thermal desorption. Leaving soils on-site and under a cap is less permanent and only equally as effective if you assume (as we do not) that the surface of the soil today will always be there to provide protection. Part of the long term effectiveness of alternative 10 depends on use of deed restrictions, which have had mixed results at other superfund sites.

Future productive use the site is important to the community. Alternative 6 provides a soils cleanup that leaves the site free of encumbrances for future use. Alternative 10 would require deed restrictions (which have been used with mixed results at other superfund sites) and would not allow for certain types of excavations on the site and is thereby inferior to alternative 6. With a more complete reduction of soil contaminants, both the EPA and the PRPs are less likely to be required to take any future action at the site.

## 4) Reduction of toxicity, mobility, or volume

Alternative 6 soils treatment aggressively performs a real reduction of toxicity, mobility, and volume using the thermal desorption process. Alternative 6 stands heads and shoulders above alternative 10 in addressing this criteria. Alternative 10 would leave contaminated soils on-site which allows the toxicity and volume of contaminated soil to remain unchanged after the remedy

is complete. The mobility of the contaminants in the buried soils is also unchanged.

5) Short-term effectiveness

Alternative 6 soils cleanup should meet ARARS within one year of implementation. It meets the criteria for short term effectiveness.

6) Ability to be implemented

Alternative 6 soils treatment is a proven technology and easily implemented at this site.

7) Cost

Alternative 6 is more expensive than Alternative 10, but the differential between the two should be examined more closely. In alternative 6 for the buried debris, the FS states 4000 CY of buried debris is anticipated to be generated and disposed of in a TSCA landfill. In alternative 10, the volume of buried debris/soils included in the costs for TSCA landfiling is 2,000 CY. Since the disposal costs for soils or debris is the same in alternative 10, either alternative 10 must double the cost of the buried debris or alternative 6 costs should be reduced by the same amount (see Table 1). This analysis liberally allows for the cost of treating the remaining 10,000 CY of soil to apply solely to Alternative 6. If, however, all 10,000 CY of soil anticipated for treatment in alternative 6 is not below the  $10^{-4}$  level, additional costs should be added to Alternative 10 to reflect the cost of TSCA landfiling these soils. In short the cost differential reflected in the FS document is not correct and needs a close examination during the writing of the Record of Decision.

As stated in comment 2 above, CHNC feels that there is a real cost to the Swede Town community for a limited cleanup. These costs will be reflected in property values and in "human costs" which are real and have value, and must be evaluated by EPA in the decision-making process.

8) State acceptance

The State has supported EPA in accepting Alternative 7 as their choice. On 10/18/95 the State confirmed that it continues to support this alternative. The only difference between alternative 7 and our choice of 6 is the ground water remedy. CHNC and the State of Utah

support the same soils remedy for the site.

9) Community acceptance

CHNC, Salt Lake City Office of the Mayor, and the Salt Lake City/County Health Department (representing the county's position) all support the soils remedies in alternative 6. At the final vote of the entire community council (75 in attendance). only one vote was cast in the negative. This indicates the overwhelming unity in support of the council's preference for Alternative 6.

**Response**

Section 9.0 of the Record of Decision details the summary of the comparative analysis of the alternatives which compares alternative 6 with all the other alternatives, including alternative 10, the selected remedy. Sections 10.0 and 12.0 describe the selected remedy, and the statutory determinations regarding the selected remedy, respectively. Section 11.0 describes the information that is new or that was revisited in the effort to select a remedy. EPA believes that the selection of alternative 10 is in accordance with CERCLA and is consistent with the NCP and EPA's guidance in selecting response actions.

CERCLA requires the selected remedy to be in accordance with the National Contingency Plan and provide a cost-effective response. Cost-effectiveness is defined by evaluating long- and short- term effectiveness, and reduction of toxicity and mobility and volume through treatment against the cost. The risk presented by the site soils is  $9.75 \times 10^{-5}$  to an industrial worker. This risk level is within EPA's acceptable risk range of  $10^{-4}$  -  $10^{-6}$ , however, EPA believes that further actions should be taken. Thus EPA is supportive of excavating and disposing in an off-site Subtitle C or D permitted landfill, as appropriate, all isolated hot spot soils areas that exceed  $10^{-4}$ , which will have the overall effect of further reducing the  $9.75 \times 10^{-5}$  risk. The remaining soils will be buried on-site under a 42 inch clean soil cap.

The source of the contaminants with these soils is primarily PAHs while, although long chain hydrocarbons, will degrade over time thus further reducing their potential to yield risk. Thus the long-term risk at the site is minimal, both because the exposure pathway will be cut-off by 42 inches of clean soil.

Although the treatment of these soils would provide further reduction of risk, the existing concentration of contaminants within the soils are within EPA's acceptable risk range for an industrial worker. Treating soils within EPA's acceptable risk

range is not an expectation expressed in the NCP and existing EPA policy. For example, the NCP states that EPA is expected to use engineering controls, such as containment, for waste that poses a relatively low long-term threat. EPA's preference for treatment is generally applied to principal threat waste or to reduce the risk to within EPA's acceptable risk range. Since the soils do not present a principal threat and the soils are within EPA's acceptable risk range, treatment cannot be justified.

The difference between alternative 6 and alternative 10 is primarily the actions regarding the soils and buried debris. The total cost difference is \$8.1 million. Both alternatives are equally protective of human health and the environment.

A National Remedy Review Board (NRRB) was established by EPA as one of the October 1995 Superfund Administrative Reforms to help control remedy costs and promote both consistent and cost effective decisions at Superfund sites. All proposed cleanup actions are to be reviewed by the Board where: (1) the estimated preferred alternative exceeds \$30 million; or (2) the preferred alternative costs over \$10 million and this cost is 50% greater than that of the least-costly, protective, Applicable, Relevant and Appropriate Regulation (ARAR) - compliant alternative. The preferred alternative for Petrochem, as presented in the Proposed Plan, triggered the second criteria for review by the NRRB. The Proposed Plan for the Site, issued in July of 1995, identified Alternative 7 as EPA's preferred alternative. The total cost of Alternative 7 is estimated to be \$16.6 million. The least costly, protective, ARAR-compliant alternative (Alternative 10 in the Proposed Plan is estimated to cost \$6.1 million).

In its review, the NRRB considers the nature and complexity of the site; health and environmental risks; the range of alternative actions considered to address site risks; and quality and reasonableness of the costs estimates for alternatives; regional, State/tribal and other stakeholder opinions on the proposed actions to the extent they are known at the time of review; and any other relevant factors or program guidance.

The establishment of the NRRB was intended to bring to bear the Agency's extensive experience on decisions at a select number of high stakes sites. Generally, the NRRB makes "advisory recommendations" to the appropriate Regional decision maker. In this instance, that recommendation states that, "...the NRRB believes that the Region may benefit from considering other less costly alternatives that address only the principal threats through treatment while yielding fully beneficial property use with minimum restrictions." The Board's recommendation are part of EPA's decision making process, and were carefully considered in Region VIII's selection of Alternative 10 as the final remedy for the Site.

## 5) Comment

Comparison of costs associated with the cleanup of the buried debris.

Alternative 10 cost (per the Second Addendum to the Final Revised, Feasibility Study - Petrochem/Ekotek Site, April 7, 1995) and Alternative 6 cost (per the FS) are tabulated below. In this tabulation several changes have been made to the cost analysis from the original FS documents. The intent here is not to make the cost estimates "more accurate" but to make sure the cost comparisons are apples and apples. We do not believe the original FS documents made an accurate-comparison in this respect.

No changes have been made to the unit costs of any of the items in Table 1.

Rationale for Table 1 is as follows:

Dust/Air Controls: In Alternative 6 vapor enclosures were used while in Alternative 10 foam was used. Assuming that either technology is effective, it seems unreasonable to charge a vapor enclosure to Alternative 6 when a much less expensive technique of foam will be equally effective. Therefore, foam was used in the costs for both alternatives. The operation and maintenance cost for the vapor enclosure was, therefore, omitted from the costs of Alternative 6.

Volume of soil in Alternative 10: The same volume was applied (4,000 CY) under the "Quantity" in Alternative 10 as in 6 to be sure the cost comparison reflected performing the same task on the same volume, where appropriate. It is possible that the volume estimated will be different. If the buried debris volume is overestimated, the cost benefit will apply equally to both alternatives. The quantity of buried debris, for cost comparison, is moot. Overestimation of contaminated soils of  $10^{-4}$  and below will reduce the cost of Alternative 6, this overestimation will have no cost reducing effects on alternative 10. Underestimation of the amount of "hot spot" soils will increase the cost of the alternative 10 while having no cost effects on alternative 6. Alternative 6 is only going to cost more if the total amount of contaminated soils increases, while alternative 10 will become more costly if the "hot spot" soils associated with the buried debris increases.

Demolition of Slab: This cost was omitted from Alternative 6 in the FS, but added to that alternative

in this analysis.

Investigation under slab: This cost was omitted from alternative 6, but added to that alternative in this analysis. It is unrealistic to assume that once the slab has been demolished add removed that these data will not be gather under either alternative.

Other costs applied as a percentage of capital costs: These costs were applied equally to both alternatives and the contingency cost was reduced from that which was originally in Alternative 10.

## **Response**

EPA has reviewed the cost estimates submitted in the feasibility study and finds that these cost estimates are within the level of accuracy required by EPA's guidance which is +50% / -30%. EPA agrees that there are differences in the estimates and appreciates the effort that has been expended on the commentor's part to compare the estimates. The commentor's comparison of "apples to apples" shows that there is a difference of \$2,114,907 which represents a difference between alternatives 6 and 10 of \$5,985,093. Taking into account the commentor's comparison, alternative 10 is a little less than half the cost of alternative 6 and achieves the threshold criteria of protection of human health and the environment. Alternative 10 disposes off-site soils that exceed the soil hot spots and LNAPL-saturated soils. The ROD describes how the debris area will be excavated and how the LNAPL-saturated soil within the buried debris will be disposed off-site. The commentor's comparison verifies that although the cost differences between alternatives 6 and 10 may be narrowed by \$2 million, the remaining cost gap between the two alternatives is still quite significant.

## **6) Comment**

Aquifer Characterization Report.

General Comment: The report is an important addition to understanding the hydrogeology of the site. The figures and illustrations are very helpful in understanding the points presented. The CHNC attended and participated in developing the conclusions at the meeting held on August 28 and 29, 1995 regarding this document. We continue to support those conclusions.

Additional data needs were discussed during this meeting and we very much encourage development of these data needs as part of the Record of Decision. Our support of intrinsic remediation is contingent upon further investigations into its effectiveness at the

site and additional monitoring locations west of the presented wells.

**Response**

See response to comment 3.

**7) Comment**

Aquifer Characterization Report

1. Page vii, paragraph 2, last sentence. Data in the report does not support the conclusion that ground water beneath the site is stagnant. In a high conductivity aquifer the volume of water moving through the aquifer can be the same as that moving through adjacent lower K materials and at the same time have proportionately reduced gradient.

**Response**

EPA believes that the data collected to date does show migration of contaminated ground water to the northwest and west of the Site which clearly refutes the idea of stagnation. However, EPA believes that the flow is relatively slow. EPA believes additional data is needed to fully and accurately define the flow rate for the site and believes that this information is vital to proving the hypothesis that the contaminated ground water directly beneath the Site is undergoing bioremediation at a rate that prevents further migration of contaminated ground water beyond the present extent of contamination.

**8) Comment**

Aquifer Characterization Report

2. Page 3-5, paragraph 2, 1st sentence. The geothermal gradient for the Salt Lake Valley is much higher than the rest of the Great Basin according to Klauk and Riji, 19\_\_, Utah Geological Survey publication. They estimate the gradient to be 589 C/km.

**Response**

For purpose of responding to comments on the Aquifer Characterization Report, EPA has concentrated its efforts to respond to issues directly relating to selection of the remedy. EPA did not generate this report and cannot provide the interpreted information or answer questions as to how the document was developed as requested by the commenter.

**9) Comment**

Aquifer Characterization Report



3. Page 3-5, paragraph 3. Figure 3-6 needs to have the contour interval specified.

**Response**

See response to comment 8.

**10) Comment**

Aquifer Characterization Report

4. Page 4-2, paragraph 2. Figure 4-2 shows the potentiometric surface of Units 1, 2 and 3 converging just west of the site. This is certainly plausible, but the available data leaves the possibility for other interpretations. The presence of the shallow bedrock below the site may mean Unit 3 is not directly connected to Unit 1.

**Response**

See response to comment 8.

**11) Comment**

Aquifer Characterization Report

5. Page 4-2, paragraph 3. Recharge to Unit 3 may also come directly through the bedrock/valley-fill interface below the site.

**Response**

See response to comment 8.

**12) Comment**

Aquifer Characterization Report

6. Page 4-3, top sentence. The amount of flow from Unit 1 to Unit 2 may be understated. Evapotranspiration from unit 2 and less permeable sediments just west of the site to block the upward flow from Unit 3 would enhance this flow potential.

**Response**

See response to comment 8.

**13) Comment**

Aquifer Characterization Report

7. Page 4-7, reference to figure 4-7. It is understood that the

potentiometric contour lines in this figure are interpretive. If, however, the cross section were contoured strictly on the basis of head without regard to the three units, the flow net in the area of the site would look quite different. The lowest head value in this area is in the deep zone from well P-5. Since ground water flows to lower head, it seems very reasonable to assume that shallow ground water below the site is moving both down and to the west. This relationship is completely missed in the cross section.

Based on these data, it is important that new wells be considered for the area to the west of P-5/P-6 and at depths similar to the deeper zone and perhaps beyond that depth. This is the most likely area for contaminants from the site ground water to move to based on the current report. The fact that contaminants have appeared in the deeper zone of P-5 should sound the alarm that contaminants may be leaving the site to the west, at depth. With this new information on the contaminant flow direction to the west (May 1995 samples from deep zones of P-5 and P-6) it is ever more likely that contaminated ground water may find its way either into surface discharge to the west wetlands and ponds or, perhaps into Unit 3. Both of these paths are very undesirable and must be closely monitored.

#### **Response**

EPA agrees with the concerns expressed in this comment. The location of the compliance boundary is graphically delineated in the ROD and shall be further refined during the remedial design. The areal extent of this contamination as well as the depth of this contamination must be clearly delineated to ensure no further migration of the contaminants. The containment contingency has been fully described in the ROD and shall be implemented to prevent further migration of contamination beyond its current extent.

#### **14) Comment**

##### **Aquifer Characterization Report**

8. Page 4-7, paragraph 3. The reference to a trend of "geothermal activity" increasing in the spring to early summer cannot be confirmed by examination of discharge data from Wasatch hot Springs from 1920 to 1939 (*Ground Water in the Jordan Valley Utah*, Taylor and Leggette, 1949, U.S. Geological Survey Water Supply Paper 1023, P. 40-41). Perhaps this trend is one found generally in thermal springs in Utah, but historical data from this nearby spring does not confirm the statement in the report. If site specific data exists to support this conclusion it should be included in the report.

#### **Response**

See response to comment 8.

**15) Comment**

**Aquifer Characterization Report**

9. Figure 5-6. The contour line for vinyl chloride is incorrectly plotted on the map. Well W-4a has a concentration of 3.87 and lies outside the 1.0 contour line. Well MW-7 has a concentration of 0.62 and lies inside the contour line. Has the rest of the contouring on other maps been done with the same care?

**Response**

See response to comment 8.

**13.2.2 EPA's Response to Comments from Mayor Deedee Corradini of Salt Lake City, Utah**

**16) Comment**

The Capitol Hill Community Council and the TAG group have selected Alternative 6 as their preferred alternative. In the interest of long-term effectiveness and permanence, as well as the reduction of toxicity, mobility and volume, the City joins the community in their support of this alternative.

**Response**

See response to comment 4.

**13.2.3 EPA's Response to Comments from Salt Lake Area Chamber of Commerce, Fred S. Ball, CCE, President CEO and Arlen Crouch, Chair, Board of Governors.**

**17) Comment**

The Salt Lake Area Chamber of Commerce Environmental Committee met recently to discuss the various alternatives for addressing soil and ground water contamination at the Petrochem/Ekotek Superfund Site in Salt Lake City. The committee unanimously concluded that "Alternative 10" was the most cost effective remediation method (it is our understanding that "Alternative 10" is \$10 million less than EPA's "Alternative 7) which would meet EPA cleanup goals and protect public health and the environment. After full consideration of the facts, the Board of Governors of the Chamber supports the committee's decision, and feels that "Alternative 10" is the most cost effective and reasonable plan to complete the cleanup operation.

We exhort the Environmental Protection Agency to make

"Alternative 10" the cleanup process which will finally bring this issue to a close.

## **Response**

See response to comment 4 and 18.

### **13.2.4 EPA's Response to Comments from the Community Action Program, Karen Silver**

#### **18) Comment**

I am writing to comment on the Proposed Plan for the Petrochem/Ekotek site. The Capitol Hill Neighborhood Council TAG Committee, which I have been providing advocacy support to, supports Alternative 6 as being of most benefit to the neighborhood. At the Council meeting on October 28th the entire group voted. Alternative 6 was chosen by a very wide margin.

The issue of cost benefit ratios has been raised pertaining to this site. I would like to address this. In none of the alternatives do I find information about cost benefits to the residents. This needs to be factored into any alternative. These are people who have diligently over the years reported concerns about the activities of Ekotek and its predecessors to, entities which could have taken action. Property values have not risen. Basic amenities such as sewer connections have not been put in the area. The prospects these residents face if they even think of trying to sell and move are bleak. These residents are practically being forced to stay in the area. Options that residents in other communities have, such as making major improvements to property or moving, are being severely limited for the residents in this neighborhood. These residents deserve, the best cleanup possible. At present, Alternative 6 seems to fit the bill.

## **Response**

The response to comment 4. With respect to cost benefits, CERCLA and the NCP defines how EPA is to evaluate cost-effectiveness of a remedy. Section 121 of CERCLA states "in evaluating the cost effectiveness of proposed alternative remedial actions, the President shall take into account the total short- and long-term costs of such actions, including the costs of operation and maintenance for the entire period during which such activities will be required." The NCP states "Cost-effectiveness is determined by evaluating the following three of the five balancing criteria noted in Section 300.430(f)(1)(i)(B) to determine overall effectiveness: long-term, effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-

effective. A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." CERCLA and the NCP do not allow EPA to consider local property values or other factors cited in your comment as part of the evaluation of cost-effectiveness. However, CERCLA requires that the selection of the remedy take into account the degree of support of a remedial action by parties interested in the site. The NCP details a process for the participation of the public and identifies Community Acceptance as one of the modifying criteria of the nine criteria used for evaluating and selecting a response action. EPA has reviewed all the comments submitted to EPA by all interested parties and has incorporated these comments into the selection of the remedy. This responsiveness summary provides EPA's responses to each of the comments submitted to EPA by all interested parties. EPA believes that the selection of alternative.10 is in accordance with CERCLA and is consistent with the NCP and EPA's guidance in selecting response actions.

#### **13.2.5 EPA's Response to Comments from Ten Swedetown Residents**

##### **19) Comment**

We the residents of the Swedetown area in Salt Lake City, Utah live feel very strongly that the clean up project for the Ekotek Site should be cleaned up and we support Alternative #6 process.

We feel that the residents have been the real losers in the situation, due to the possible health risk that Ekotek has presented.

We feel that it is important that this site gets cleaned up and in a proper manner.

##### **Response**

Alternative 10, the selected remedy, is protective of human health and the environment. The LNAPL, which EPA believes to be the source of contamination to the ground water, will be excavated and incinerated off-site. The ground water will be remediated through bioremediation/attenuation. The soils that exceed the hot spot criteria will be disposed off-site. The remaining soils, which are within EPA's acceptable risk range for the industrial worker, will be contained under a 42 inch clean soil cap. The industrial worker scenario was chosen because of the area is zoned industrial, leading EPA to believe that the likelihood for residential development is low. The selected remedy eliminates exposure to both the industrial worker and to anyone who accesses the Site. The selected remedy eliminates all exposure pathways and thus prevents any possible health risk to the local residents and the industrial worker.

#### **13.2.6 EPA's Response to Comments from North Associates**

**Incorporated, Allan Woodbury**

**20) Comment**

As a resident of the Capital Hill Community, I would like to go on record as opposing the recommendation that is being made by our neighborhood council that Cleanup Method Alternate 6 be imposed on the PPA's.

My feeling is that the PPA's should choose the method of cleanup that satisfies EPA & legal criteria, which would likely be Alternate 10.

Words such as "contamination", "toxic", etc. throw fear into the minds of the general public. Most people have no real perception of relative risk factors, as they apply to public health. The greatest harm from Ekotek has been to the surrounding property values, which are primarily reduced by the fact that the Ekotek site has been labelled a "superfund site". The label itself is more harmful to the health of the residents than are the contaminants at the site.

My own opinion is that the superfund law is a bad piece of legislation which unfairly penalizes innocent people & destroys property values. The bulk of the money is being spent on lawyers and studies, neither of which really do much to cleanup the sites. Common sense is being ignored & the economy suffers.

**Response**

See response to comment 4. EPA's use of the words "contamination" and "toxic" is not meant to throw fear into the minds of the general public, but to explain the findings of the investigations that have been completed at the Petrochem/Ekotek Site. EPA has engaged the public in a conversation about the risks posed by this site and the use of the terms "contamination" and "toxic" are a necessary part of our vocabulary to explain the results of the remedial investigation and the baseline risk assessment

**13.2.7. EPAs Response to Comments from Claude H. Nix Construction, Incorporated, Claude H. Nix, President.**

**21) Comment**

Small companies such as ours are rarely able to afford legal assistance that requires a considerable amount of time. Therefore, we selected to pay the "used oil Settlement (No opener)" proposed to us. It later came to our attention that larger companies. Through the lengthy legal process have successfully reduced their settlement amount to somewhat less than half of the specified amount for gallon. This amount was

already less than that charged to small contributors. In addition, since the amount collected is well over the amount needed for the cleanup, they may not have to pay at all. Although they have probably spent considerable amounts for legal fees, no environmental improvement has occurred. Suggestion: Once a settlement amount is decided, it should not be negotiable.

#### **Response**

Comment is noted.

#### **22) Comment**

During the course of events, we have received a minimum of two copies of all pertinent documents. This includes copies sent to our lawyer. Not only is this wasteful and confusing for small companies, it is contrary to EPA's mission of pollution prevention and conservation. In addition, the Publication announcing the proposed plan was printed in what appears to be an expensive manner, i.e., special order paper in booklet form. Suggestion, only keep defendants on the mailing list. Include lawyers only upon a defendant's request. All documents should be copied on inexpensive recycled paper, double sided.

#### **Response**

EPA's standard procedure is to produce all documents as double sided to reduce waste. The brochure on the proposed plan was in fact printed on recycled paper as indicated on the back page of the document. One method EPA uses to keep the public informed is the distribution of fact sheets. EPA maintains a mailing list of all PRPs, interested businesses, attorneys, State and local government representatives and citizens and uses this list to mail fact sheets. Anyone who does not want to receive EPA's fact sheets can, upon their request, be taken off the mailing list.

#### **23) Comment**

The Superfund law is a detriment to environmental protection. Small companies intending to do their part to protect the environment, but are unfortunate enough to become involved in a Superfund case, are left Cynical and discouraged. It is unlikely that any of these small companies will voluntarily or willingly cooperate with state or EPA on other more positive issues and programs. Suggestion: It is our opinion that much could be gained in the relationship between the defendants and the government agencies if the surplus amount collected by the "Committee" is refunded to contributors. The amounts should be in proportion to those amounts paid. If this is not possible, the defendants should be able to be a part of the decision making process on how the extra money is to be spent.

## Response

The Superfund law has provided the legal framework for the cleanup of over 3,000 sites nationwide. CERCLA liability is retroactive to the parties who either generated, transported to, or were owners and/or operators of a site where hazardous waste has contaminated the environment. It is EPA's policy to "cash out" parties who contributed a minor portion of the waste (de minimis portion) to the site. Often these parties are small businesses. The purpose of de minimis settlements is to allow parties to cash out early during the Superfund process so that they can save the transactional cost of participation. A meeting was held at the Salt Lake Hilton in February, 1992, to discuss the EPA 104(e) information request letters and to offer de minimis settlements through ESRC.

EPA's de minimis settlements were based upon a range of potential future remedial alternatives that are fully described in the Preliminary Identification of Remedial Alternatives (PIRA) published in 1993. The first two quarters of data collected at the Petrochem/Ekotek Site formed the basis of the conclusions and the development of the alternatives, described with associated estimated costs, in the PIRA. The first two quarters of sampling had higher concentrations of contaminants than the subsequent quarters, as explained in the ROD. The Proposed Plan is based upon significantly more data than the PIRA. Thus the total response cost estimated for cleanup of the Petrochem/Ekotek site which was used by EPA for purposes of settling with de minimis parties was higher than the alternatives described in the Proposed Plan published in July 1995. De minimis settlements with EPA are voluntary and are offered as a form of insurance against other parties that might sue them for contribution. So although the de minimis settlements were conducted in a manner consistent with EPA's policy, EPA recognizes that the de minimis settlers have said more than their proportionate share. However, to provide reimbursements, EPA's policies regarding settlements would have to be completely restructured. The current policy does not envision the concept of reimbursements to de minimis settlers.

### **13.2.8 EPA's Response to Comments from Robert's TBA Service, Incorporated, Steve Roberts, Trustee for Robert's TBA**

#### **24) Comment**

Ed Roberts is deceased. His spouse Wanda feels terrible you have extracted so much money from her. I only am trying to help her. Your agency is a terrible blight on citizens that have been honest and hardworking for years. I'd have gotten all the money you could from my parents. Quit bothering my widowed mother. A lowly gas station owner is dead, the business is gone. The government has accomplished its purpose.



## **Response**

EPA would like to express sincere sympathy on the passing of your father. Your father's business was identified as either a generator or transporter of the waste oil that was disposed at the Petrochem/Ekotek site and is a portion of the contamination at the site that requires remediation. CERCLA, the law governing the remediation of hazardous waste sites and the associated liability, requires that the generator or transporters or owner and/or operators pay for the cleanup. EPA recognizes the impact this action has had on a number of people in similar situations, and so proposed the de minimis settlements to minimize the impact on individuals and to adhere to the intent of the law.

### **13.2.9 EPA's Response to Comments from Woodward-Clyde, John N. Philbrook, Vice President, Manager, Denver Operations**

#### **25) Comment**

I am pleased to see that EPA is now addressing the final cleanup alternatives for the Ekotek site. However, I find the EPA preferred alternative, Alternative 7, to be very costly in light of similar cleanup goals achieved by other alternatives that cost much less.

When compared to the other alternatives given in the Proposed Plan, Alternative 4, 5, 6, 8, and 10 all meet the EPA cleanup goals that are protective of the public health and the environment. Of these alternatives, Alternative 10 is the most cost effective cleanup alternative for the Site that meets the EPA cleanup goals. Alternative 10 is as protective as EPA's preferred Alternative 7 in terms of reducing soil and groundwater exposures and, therefore, risks; however, Alternative 10 costs over \$10 million dollars less.

I would request that the EPA further consider the costs in implementing cleanups in its remedial decisions, as well as the reduction of risks, therefore, I urge the EPA to choose Alternative 10 as the preferred cleanup alternative for the Petrochem/Ekotek Superfund Site.

## **Response**

See response to comment 4.

### **13.2.10 EPA's Response to Comments from ITEX, Peter P. Fote, Western Region**

#### **26) Comment**

I find the EPA preferred alternative, Alternative 7, to be unreasonably stringent and costly in light of similar cleanup

goals achieved by other alternatives that cost much less.

When compared to the other alternatives given in the proposed Plan, Alternatives 4, 5, 6, 8 and 10 all meet the EPA cleanup goals that are protective of the public health and the environment. Of these Alternatives, Alternative 10 is the most cost effective cleanup alternative for the Site that meet the EPA clean up goals.

It is my opinion, derived from knowledge of the subsurface biogeologic conditions at the Site, that state-of-the-art ground water pump and treat technology will not be productive in the cleanup of the dissolved phase portion of contaminated groundwater. The reason is the vertical hydraulic conductivity on the shallow thermal aquifer below the Site is as equal to or greater than the horizontal, hydraulic conductivity. A groundwater pump and treat system will yield greater amounts of geothermal water over time and less meteoric fresh water from where the dissolved contaminants reside. The radius of influence in the meteoric fresh ground water in the horizontal plan will be minimal in relation to capturing the dissolved phase plume. Potentially, the pump and treat system will yield vast amounts of clean geothermal water to be discharged to the POTW for treatment. Also, the geothermal groundwater beneath the Site has a conductivity in the range of 15,000 FO/cm versus the conductivity of the meteoric fresh ground water which is 1,000 FO/cm. The POTW will have problem treating the high conductivity geothermal groundwater. The groundwater pump and treat system will achieve nothing but the treatment of vast amounts of clean ground water over the life of the system at extensive cost to the PRP Committee. The natural attenuation of the dissolved phase plume is the only economically and technically feasible treatment available due to the hydrogeologic subsurface conditions existing at the Site.

Alternative 10 is as protective as EPA's preferred Alternative 7 in terms of reducing soil and groundwater exposures and, therefore, risks; however, Alternative 10 costs over \$10 million dollars less.

I believe it is time that the EPA be reasonable and consider the costs of implementing cleanups in its remedial decisions, as well as the reduction of risks; therefore, I urge the EPA to choose Alternative 10 as the preferred cleanup alternative for the Petrochem/Ekotek Superfund Site.

## **Response**

See response to comment 4 and 18. Alternative 10, the selected remedy relies upon bioremediation/attenuation to address the contaminants within the ground water plume. However, EPA will rely upon a pump and treat system for the containment contingency

off-site if containment is deemed necessary to prevent further migration of the contaminants. By selecting alternative 10, EPA is not concluding pump and treat could not be effective at the site. Alternative 10 provides overall a better balance of trade offs among the nine criteria for remedy selection. EPA recognizes some of the potential difficulties associated with pump and treat. However, if bioremediation/attenuation does not work or is ineffective in meeting remediation levels, then pump and treat may be the next best approach.

#### **13.2.11 EPA's Response to Comments from Morrison Knudsen Corporation, Donald J. Carpenter.**

##### **27) Comment**

A technical review of the EPA's Proposed Plan for the Ekotek Superfund Site allows one to conclude that Alternative 10 more cost effectively achieves the protective goals set forth in CERCLA than the selected Alternative 7. Figure 3 presented in the July, 1995 EPA announcement for the proposed plan of the Petrochem/Ekotek Superfund Site documents that Alternative 10 meets the two threshold cleanup criteria and the five balancing criteria. The EPA has noted that Alternative 10 "meets minimum requirements" for certain cleanup criteria. Moreover, the EPA has suggested that other alternatives, such as Alternative 7, "Fully complies with the requirement". Clearly the EPA is attempting to incorrectly subdivide compliance criteria.

Fundamentally, an alternative either complies or does not comply with a criterion. It is recognized that more expensive treatment, beyond that required to comply with the criteria, may be employed. The cost benefit of this additional treatment is, however, questionable. Alternative 10, which employs industry proven containment practices, can be readily implemented without the short-term concern of exposing the community to Products of Incomplete Combustion (PICs) generated during on-site thermal treatment; compounds that may pose a significant additional threat to residents and the community. The acknowledgement by the EPA that Alternative 10 meets the CERCLA evaluation criteria, argues that this readily implementable alternative, that does not create an additional short-term exposure hazard to the community, should be selected in lieu of Alternative 7.

##### **Response**

The threshold criteria of Overall Protection of Human Health and the environment, and Compliance with ARARs are criterion that each alternative must meet in order to be eligible for selection. Long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost are considered primary balancing criteria. The alternatives by nature of the actions being

considered achieve varying degrees of each of the balancing criteria. Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. EPA acknowledges that alternative 10 meets the threshold criteria.

See also response to comment 4.

**13.2.12 EPA's Response to Comments from Liaison Defendants in the Civil Action, Ekotek Site PRP Committee V Self et al., Civil No 94-C-277K, submitted by the law office of Parry Murray Ward & Moxley, Douglas J. Parry, Esquire and Bret F. Randall, Esquire.**

**28) Comment**

**EPA should Select the most Cost Effective Remedy.** The Liaison Defendants are potentially liable for remediation costs at the Petrochem/Ekotek site for nothing more or less than selling, transporting, or otherwise conveying new and used petroleum products for the sole purpose of recycling and re-use. The United States Congress long ago found and declared as follows:

The Congress finds and declares that -  
    (1) used oil is a valuable source of increasingly scarce energy and materials;  
    (2) technology exists to re-refine, reprocess, reclaim, and otherwise recycle used oil;  
    (3) used oil constitutes a threat to public health and the environment when reused or disposed of improperly; and  
that, therefore, it is in the national interest to recycle used oil. . .

42 U.S.C. 6901a.

Ekotek was federally and state licensed and had an EPA hauler identification number and held itself out to be a viable, legal recycler of used oil and other petroleum materials. The Liaison Defendants were instructed and in many cases required by the Utah State Department of Health to convey their used oil to licensed used oil recyclers, including Ekotek. The Liaison Defendants never believed that their re-use and recycling of petroleum would give rise to such significant environmental liability for the Petrochem/Ekotek site. To the contrary, the Liaison Defendants reasonably believed that their attempt to re-use and recycle their petroleum was a positive attempt to help the environment. In fact, many of the Liaison Defendants accepted quantities of used petroleum from "do-it-yourself" customers who likely would

have improperly disposed of their oil had the Liaison Defendants not accepted it for recycling. Now these Liaison Defendants are potentially liable for these same volumes of oil that likely would have been dumped in fields or into the sewer.

In light of Congress' findings and the strong federal policy favoring the recycling of used petroleum, the conduct of the Liaison Defendants in selling, transporting or otherwise conveying new and used petroleum products for the sole purpose of recycling and re-use is fundamentally different from a more typical federal superfund site, where companies literally dump worthless chemicals on a site with the intent to ultimately dispose of their wastes. None of the Liaison Defendants dumped a worthless, contaminated byproduct at the Petrochem/Ekotek Site with the intent to ultimately dispose of the waste.

Moreover, numerous of the Liaison Defendants are "service station dealers" within the meaning of CERCLA 114(c), U.S.C. 9614(c) and complied with the Used Oil Management Standards. The only reason these Liaison Defendants are potentially liable for costs of remediation at the Petrochem/Ekotek Site, according to the judge in the civil action, is that EPA delayed promulgation of the used oil management standards for years after Congress required that the standards be passed. EPA's delay should, not penalize the Liaison Defendants who can establish their entitlement to statutory protection as a "service station dealer."

Imposing CERCLA liability on the Liaison Defendants for recycling petroleum has severely impaired Congress' stated policy that the recycling of used oil is in the "national interest" and that service station dealers are entitled to a statutory exemption from liability under CERCLA. EPA should not further exacerbate these problems by selecting a remedy which is far more expensive than necessary to adequately protect human health and the environment at the Petrochem/Ekotek site.

## **Response**

EPA disagrees with the commenter's assertion that imposing CERCLA liability on parties who sent waste oil and related materials to the Petrochem Site contradicts Congress' policy that recycling oil is in the national interest. EPA also disagrees with the commenter's implication that the alternative to CERCLA liability would be disposal of waste oil in fields or down sewers. Such actions would constitute illegal disposal.

While EPA regrets that the Petrochem Site has become contaminated and subject to a Superfund cleanup action, this is in fact what has happened and EPA is charged by Congress, pursuant to Superfund, to take appropriate action to ensure that the public is not exposed to undue risk from the contamination. EPA selects the appropriate remedial actions for a Superfund Site independent

of the determination of which parties may or may not be liable at a Site. Remedial actions are selected on the basis of risk presented by the contamination released at a Site, while liability for cleanup costs is determined pursuant to Section 107 of the Superfund law (CERCLA).

Under Section 107 of CERCLA, parties who generate hazardous substances that are transported to a Superfund site and parties who transport such substances to a Superfund site for treatment or disposal may be liable for costs of cleanup. Although Congress provided an exclusion for petroleum related products, the exclusion does not extend to waste oil or other used petroleum materials that have become contaminated through use beyond the contaminate levels normally present in virgin or unused refined oil. Moreover, because recycling involves aspects of treatment and disposal, CERCLA Section 107 provides no exemption from liability for the type of recycling of waste oil that occurred at the Petrochem, Site. Finally, although Congress provided an exemption from Superfund liability for certain "service station dealers" who recycle waste oil, Congress expressly provided that the exemption would not be effective until EPA's oil recycling rules were promulgated (the rules had to first be in place because, for such dealers to qualify for the exemption, the law provides that they must demonstrate compliance with EPA's waste oil recycling rules). Because EPA's waste oil recycling regulations were not promulgated until after the Petrochem facility had stopped operating, the exemption was not available for contributors of waste oil to Petrochem.

EPA's legal position regarding these issues is presented in "Defendant United States of America's Response to Liaison Defendants' Motion for Summary Adjudication of Issues, filed on December 29, 1994, in The Ekotek Site PRP Committee v. Steven M. Self, et al., C.A. 94 C 277K (U.S. District Court, District of Utah). U.S. District Court has ruled on these issues in that case, in its Memorandum Order, March 24, 1995, and follow up Memorandum Order, June 12, 1995. In general, the ruling upholds and is supportive of EPA's position regarding liability associated when waste oil.

## **29) Comment**

The Liaison Defendants Favor Alternative 10. EPA determined that Alternative 10 satisfies all applicable requirements and standards. Alternative 10 is more than \$10 million less expensive than the remedy proposed by EPA. The Liaison Defendants prefer Alternative 10 for the following reasons:

1. The slight, perceived benefits of EPA's proposed remedy are greatly outweighed by the significant differences in cost: over \$10 million.

2. At the July 26, 1995 public meeting, even the landowners' association opposed EPA's proposed remedy on the grounds that it was too costly and that the proposal to pump and treat groundwater in the shallow aquifer will not work and is not necessary.
3. The Liaison Defendants should not be penalized for conduct they reasonably believed would actually serve to protect the environment, that is, the sale, transport and conveyance of new and used petroleum for the purpose of re-use and recycling, consistent with Congress' stated policy favoring the recycling of petroleum.
4. The contamination plume is stable.
5. Risk of off-site public exposure is virtually nonexistent.
6. The evidence suggests that intrinsic bioremediation of the shallow aquifer is feasible, effective, and the least costly alternative.
7. The evidence suggests that the pump and treat technology will not work.
8. Because the contamination plume is stable, EPA should at least give bioremediation of the shallow aquifer a chance to work. If the remedy is not effective over time, other remedies could be considered.
9. Alternative 10 satisfies all applicable standards and requirements.
10. Alternative 10 is by far the most cost effective remedy.

For the foregoing reasons, the Liaison Defendants hereby request that EPA change its proposed plan and select Alternative 10.

## **Response**

See response to comment 4. The stability of the plume has not been verified by the data collected to date. Although, an observation of the existing data leads EPA to believe that migration of contaminants from the Site is slow, the actual containment of the plume cannot be verified with the existing data. The selected remedy requires the collection of further data to support that bioremediation is occurring at such a rate as to contain any further migration of the contaminants. Until that information is available, EPA believes that assertions as to the

stability of the plume cannot be substantiated.

### **13.2.13 EPA's Response to Comments from Kennecott Utah Copper Corporation, Frederick D. Fox, Director Environmental Affairs.**

#### **30) Comment**

Kennecott is aware of comments being submitted by the ESRC on EPA's Proposed Plan for the Site and fully endorses these comments and requests that the record recognize Kennecott's belief that Alternative 10 is a more effective cleanup remedy than the EPA preferred Alternative 7 for the reasons outlined below and in the ESRC's comments.

Kennecott also believes that the EPA preferred Alternative 7 is arbitrary and capricious and does not consider all relevant facts and findings presented in the Remedial Investigation and Feasibility Study for the Site.

Kennecott was named as a PRP because we, like hundreds of other companies, sent used oil to Petrochem/Ekotek Recycling Inc. in the belief that it would be responsibly recycled. Improper and illegal practices by Ekotek resulted in closing the facility and bankruptcy proceedings, leaving Kennecott and others responsible for cleaning up the Site under CERCLA. To date, Kennecott has spent several millions of dollars as part of the ESRC to eliminate any immediate and substantial risks presented by the site to public health and the environment and to continue with the remedial investigation and feasibility study. In total, the ESRC has spent over \$17,000,000 on cleanup activities and studies for this seven (7) acre site to ensure the public and the environment are protected.

EPA's preferred Alternative 7 includes on-site thermal treatment of soils, off-site treatment and disposal of oil and debris, and a pump and treat alternative for the ground water, all at an estimated cost of \$16,600,000.

Kennecott's preferred Alternative 10 includes off-site disposal of soils, oil, and debris and consolidation and encapsulation of soils that already meet EPA's acceptable risk criteria by placing an appropriate depth of clean soil at the ground surface and at the ground water table. Kennecott's preferred alternative addresses continued monitoring to ensure EPA's cleanup criteria are met. The estimated cost the Kennecott's preferred alternative is \$6,100,000, substantially less than the EPA's selected alternative and all other alternatives that meet the cleanup criteria.

If the EPA includes pertinent information in the ESRC's Aquifer Characterization Report when comparing the site-wide remedial alternatives, then it clearly should discount pump and treat as a



technically viable groundwater remedy. In addition, if EPA considers cost effectiveness in the cleanup evaluation criteria (which it should), it should also discount thermal desorption as an economically viable soils remedy. Both soils alternatives, thermal desorption and clean soil encapsulation, achieve a risk-based cleanup goal of  $1 \times 10^{-6}$  and will allow for similar future uses of the Site.

In summary, for the reasons stated above and those articulated in the comments submitted by the ESRC, Kennecott requests that EPA change its selected alternative and choose Alternative 10 as being the most cost effective cleanup remedy for the Site that is equally protective of public health and the environment.

#### **Response**

See response to comment 4.

#### **31) Comment**

In addition, Kennecott attended the EPA sponsored July 26, 1995 public meeting and the August 28-29, 1995 workshop on ground water, as well as other non EPA sponsored meetings on Ekotek, and can state with certainty that the general public has not been provided with enough opportunities to fully understand the complexities associated with Site conditions to adequately comment on EPA's Proposed Plan.

Therefore, Kennecott believes it is in the best interest of the public for EPA to extend the public comment period on the Proposed Plan and additional 30 days and to conduct one more public hearing to address the conclusions reached by EPA and ESRC at the August 28-29, 1995 workshops.

#### **Response**

EPA extended the comment period through October 23, 1995.

#### **13.2.14 EPA's Response to Comments from Sierra Club Utah Chapter, Ivan Weber, Utah Chapter Sierra Club**

#### **32) Comment**

The contamination of the site under the fraudulent, environmentally contemptuous management of the site's owners was a sustained, heinous crime that has, to date, gone essentially unpunished. We applaud the determination of EPA and the State Department of Environmental Quality to remediate the site responsibly. It is unfortunate, however, that the initiation of substantial action has taken so long. While some of the reasons for this inaction are obvious (court proceedings, CERCLA proceedings, PRP identification and settlement negotiations,

technical analyses, review process mechanics, etc.) , there really should have been an aggressive triage, followed by implementation of those source-control steps, motivated by the relative infancy of the problem. It would seem that groundwater problems, especially, might have been nipped more nearly in the bud, so to speak.

## **Response**

The Petrochem/Ekotek Site was addressed by EPA's emergency response team when identified by the State of Utah as an imminent and substantial threat in 1989. The bulk of the waste, containers, tanks, pipes, sludges, process equipment, and most of the on-site facilities were removed from the Petrochem/Ekotek Site through the activities and under the auspices of the emergency response team from 1989-1992.

EPA is committed to cleaning up Superfund sites faster. The Superfund Accelerated Cleanup Model (SACM) was a program initiated by EPA in 1992 to address the seemingly slow pace at which EPA has historically cleaned up sites. To date, EPA has accomplished the cleanup of over 3,000 sites nationwide. EPA also has an emergency response team that addresses imminent and substantial threats of release when identified.

## **33) Comment**

Without knowing a great deal more about the dynamics of the plume of groundwater contamination, and especially about the interaction of the non-aqueous phase liquids with groundwater, we find it difficult to get an idea of the rate of spread of contaminants. It is a pretty good bet, though, that they are spreading, considering that they weren't there before Ekotek, but now they are where they are. This mess didn't happen in an instant. They have varying dynamics and vectors, and they need to be stopped as quickly as possible.

Please consider the voice of the Sierra Club to be added to the chorus that calls for action - - - but not action that causes more problems.

## **Response**

The selected remedy, alternative 1.0, relies upon bioremediation/attenuation to address the contaminants with the ground water plume. It is expected that the bioremediation/attenuation is occurring at a rate that would prevent further migration of these contaminants. If during the remedial action, EPA finds that bioremediation/attenuation is not occurring as anticipated, and further migration of the contaminants is demonstrated, the containment remedy may be implemented. The conceptual design of the containment remedy is

to capture the contaminants at the compliance boundary and thus prevent further migration of the contaminants.

#### **34) Comment**

Debris: Assuming that separation from oily soils is feasible, debris obviously should be removed to the nearest disposal site, whether that consists of encapsulation on-site or a qualified landfill off-site.

#### **Response**

The selected remedy, alternative 10, requires that the LNAPL-saturated soils and debris within the debris area be disposed off-site at an appropriate disposal facility.

#### **35) Comment**

Soils: The summary of remedial alternatives indicates the nine options (Alternative one is not an option), and in most of them there is some considerable quantity of contaminated soils that are removed and either treated on-site (we will return to this) or shipped to a qualified disposal site. Having advocated responsive, expedited action, we realize that this choice is not an easy one. Costs are, of course, a major consideration, along with effectiveness of the action. We have a great deal of concern about thermal destruction of this kind of potpourri of oily compounds, including dioxins, polycyclic aromatic hydrocarbons (PAH's), polychlorinated biphenyls (PCB's), and dense non-aqueous phase liquids (NAPL's), especially in proximity with dense residential communities and important wetland-related and montane ecosystems.

We are not at all convinced that this process won't produce other chlorinated hydrocarbons that stand a considerable chance of being as dangerous as the initial constituents of the oily soils. Off-site encapsulation or thermal destruction is possibly more appealing, if the site is carefully chosen, but even that is not very satisfying. Off-site bioremediation seems to offer some potential for avoidance of the kinds of problem presented by thermal processes, even if it does require a lot more time, and possibly greater cost. Energy consumption in transportation, and the pollution it produces, must also be integrated into this analysis.

With this qualification, we agree that Alternative 7 seems to be best for dealing with soils expeditiously.

#### **Response**

EPA believes that alternative 10, the selected remedy, which includes off-site disposal of all soils that exceed the soil hot

spot criteria and encapsulation of the remaining soils under a 42 inch clean soil cap offers the best balance of nine criteria.

### 36) Comment

Oily Liquids: The alternatives vary in the proportion of oily liquids that are proposed to be removed, but Alternative 7 is one that would seek to remove 100%. We believe that this approach is imperative. Thermal destruction, however, is less comforting, wherever it occurs. We are aware that much, much more significant quantities are being "burned" both in incinerators and in manufacturing operations (as fuel) on our doorstep. This does not lead us to suspend our educated guesses that some of the nation's largest sources of dioxins and furans are immediately upwind of Salt Lake City. That also does not excuse adding to the quantity by incineration of the Ekotek oily liquids. Bioremediation off-site should be fully considered as an alternative, before diving into thermal destruction - - - for ecological risk reasons, if not for human toxicological ones - - - even if that means that the 10,000 gallons of recoverable oily liquids have to be put into a monitored tank someplace while we think about it. The demise of songbirds, amphibians, and countless other creatures, as well as the incidence of breast and other carcinogens, should impose a *de facto* moratorium on incineration of these kinds of compounds, as well as on their use as energy or as carbon sources (as in magnesium extraction), until we know what we can do and how to do it safely. As it is, we continue to do things, predicated on what we do not know about their effects.

A modified Alternative 7, therefore, to seriously explore alternatives to thermal destruction, would be preferable to the Sierra Club.

### Response

The selected remedy, alternative 10, addresses the LNAPL in the same manner as alternative 7. To address the concerns of the public, EPA is continuing to work toward lowering the emissions standards for Hazardous Waste Combustion Facilities. The latest effort, summarized in the Environmental Fact Sheet titled Revised Technical Standards Proposed for Hazardous Waste Combustion Facilities dated March 1996, proposes to reduce the emission standards for hazardous waste burning incinerators, cement kilns, and lightweight aggregate kilns. The proposed standards would achieve significant reductions in some of the top priority pollutants for EPA - dioxins and furans by 98 percent, mercury by 80 percent, cadmium and lead by 95 percent, and four other toxic metals by 87 percent. In developing this rule, EPA met with affected stakeholders to elicit their feedback on a wide range of regulatory approaches. These groups include owners and operators of affected facilities, environmental groups, citizens' groups,

nonprofit health organizations, and states. EPA believes that improving a viable and proven technology is in the best interest of the protecting human health and, the environment

### 37) Comment

Groundwater: Setting aside the possibility of the presence of arsenic, extraction seems to be the best choice. Treatment of the extracted groundwater at a publicly-owned treatment works (POTW) depends utterly on the specific contaminants, a profile of which is not in-hand as of these comments. Aggressive pumping (and we question that the 60 to 90 gpm proposed in Alternative 7 is aggressive enough, and whether one extraction well is enough, either) seem desirable, considering the general north-westward flow that we understand groundwater to exhibit in this area. The possible effects on wetlands to the west of the Salt Lake International Airport are of primary concern, especially for the relatively shallow zones, which tend to emerge and blend with waters of these ecologically critical, transitional zones around the Great Salt Lake.

We also question the ability of POTW's to deal, dependably, with some of the organic contaminants that Alternative 7 may send to them, especially near-trace amounts of dioxins, PAH's, vinyl chloride, and other toxic constituents of the water an the site. Air sparging and limited thermal destruction may make some sense, but there is extreme caution appropriate, for the same reasons that were discussed earlier with respect to these contaminants in soils. The accumulation of organic chlorides due to inadequate destruction through incineration in many forms, and synthesis of these deadly compounds in many technologies, may be the end not only of many of us, but also of a tragic proportion of wildlife.

If and only if the catalog of contaminants, and their variation across the site, allow classification of site waters in such a way that the quantities of actual organics-polluted water can be reduced significantly, then it would seem that some of the "enhanced pump-and-treat technologies" outlined in the recent National Research Council document, Alternatives for Ground Water Cleanup, and in other recent scientific sources, could be considered for application to this site. This might necessitate more than one well, or a "nested" well, screened at several depths.

If, again, this approach resulted in classification of some of the water to assure that a POTW can deal with a significant portion of it, then so be it. Maybe the proximity of a golf course to the near west could allow use of some as irrigation "graywater", at significantly lower costs.

Avoidance of thermal destruction to the greatest extent possible, and avoidance of burdening a POTW with organic contaminants that

it cannot handle, or even analyze adequately, are the crux of our concerns about remedial technologies.

## **Response**

The selected remedy, alternative 10, relies upon bioremediation/attenuation to address the contaminants within the ground water plume. The public comment received regarding the technical difficulties of capturing the contaminants directly beneath the Site, the high hydraulic conductivity beneath the Site, the potential for upconing of the geothermal waters beneath the Site, and the relatively low levels of contamination beneath the Site contributed to EPA's decision to rely upon bioremediation/attenuation to address the ground water contamination. However, EPA will consider a containment contingency that includes a pump and treat system at the compliance boundary if further migration of the contamination within the ground water occurs. With respect to the effectiveness of the POTW, the POTW will only accept waste water that it is capable of achieving treatment levels as specified by its permit. Coordination with representatives of the POTW by the PRPs performing the feasibility study has shown that the POTW is capable of accepting Petrochem's waste water with two caveats. Pretreatment of the arsenic may be required and the volume must be less than 100 gpm.

### **13.2.15 EPA's Response to Comments from Monroc, Incorporated, submitted by the office of Parry Murray Ward & Moxley, Kevin R. Murray**

#### **38) Comment**

1. Monroc has no Position on the Proposed Plan Remedy Selection. Monroc has no position or comments on the Proposed Plan and the remedy selected by the Agency. Rather its comments are limited to the Aquifer Characterization Report dated June 19, 1995 by Environment and Infrastructure, Inc. (hereinafter referred to as the "Aquifer Characterization Report").

## **Response**

Comment is noted.

#### **39) Comment**

2. The Aquifer Characterization Report is Based on Insufficient and Unreliable Data. The Aquifer Characterization Report indicates that on upgradient source TCA contamination exists, contends that other solvent contaminants are degradation products of TCA, and concludes that those solvents in the ground water at the Ekotek site originated from this off-site source. The report does not name the reported source but strongly suggests that the

Monroc facility on Beck Street is located where the source is suspected. Our review indicates that these conclusions were reached based upon two samples collected in March and May 1995 from a well immediately west of the Monroc facility. The samples contained TCA in a concentration higher than typically found elsewhere in the study area. However, similar concentrations were also found north and west of Ekotek site. It is Monroc's opinion and the opinion of Monroc's consultant that insufficient documentation is presented in the Aquifer Characterization Report to conclude that the Monroc property is the source of the contaminants. This opinion is based on the following observations from, the data and methodology of the Aquifer Characterization Report:

1. The Aquifer Characterization Report (the "report") states definitively that an upgradient source of TCA exists (see pages vi, 7-1). This statement and conclusion are not supported by either the historical Ekotek site information or chemical ground water sample results. The conclusion appears to have been reached late in the analysis and was based upon the results of two ground water samples collected from Monitoring Well P-12 during March and May 1995.
2. The occurrence of TCA is not objectively depicted in the report. TCA has been detected on the east, west and north of the Ekotek site with concentrations of the same order of magnitude found on each of these sides. The Aquifer Characterization Report emphasizes the occurrences of TCA east of the Ekotek site. Figures 5-1 through 5-7 cannot be considered reliable since the contamination contours depicted extend beyond the known data. In some instances the contours are drawn based upon a single sampling point. These drawings appear to have been drafted to fit some preconceived pattern of contamination rather than to present a statistically valid presentation of the data. The graphical presentation also fails to show one of the higher detected concentrations of TCA (124 ppb) found in ground water from Monitoring Well P-13 located 1950 feet west of the Ekotek site. No statistical evaluation of the data has been conducted. It is unreasonable to base remedial action decisions on high or low anomalous values.
3. The Aquifer Characterization Report indicates that a gravel aquifer exists north of the Ekotek site and because of a higher permeability than the surrounding soil, it transports contaminants from east to west (pages 4-4, 7-1). The aquifer hydraulic conductivity testing (Table 2.2) and the variable nature of the sediments as presented in the boring logs (Appendix A)

suggest that the gravel zone depicted in Figure 4.4 is an oversimplification. Of the four aquifer tests conducted in the area, two showed permeabilities greater than 200 ft/day and two showed permeabilities less than 25 ft/day. The lower numbers are more consistent with the majority of slug tests conducted on, wells completed in the shallow aquifer. Both of the higher permeability values were obtained from, deeper wells. Similarly high values would likely be obtained from testing deeper strata at most of the monitoring well locations. No permeability test was reported for Monitoring Well P-12. The significance of this is that no permeability test has been conducted in the area of the suspected upgradient source. The suggestion of a higher permeability gravel conduit also conflicts with another conclusion of the Aquifer Characterization Report that states "the fine-grained sediments in Unit 2 acts as a dam to westward flow away from Unit 1" (page 4-9).

4. Well logs indicate that the majority of PID hits were encountered in the shallow sediments indicating that the contaminants were initially in the shallow soil and were not migrating at depth onto the Ekotek site. This contradicts the conclusion that contaminants migrated to the site from an upgradient source.

5. Ground water elevations used to determine the ground water gradient were corrected for temperature based upon the expansion coefficient of water in a Cylinder. This methodology may be flawed since a ground water monitoring well is not a closed Cylinder but a slatted screen that allows water to equilibrate to the surrounding materials. Therefore, the Rust ground water gradient maps may be unreliable and the conclusions based on them invalid.

6. The comparison of the interaction between the thermal water and the ground water with that of sea water and fresh water (page 4-3) may be unrealistic since the difference in density between sea water and fresh water is much larger than the difference in density between the ground water and thermal water at the Ekotek site. Again, this may call into question the validity of the basic assumptions of the Aquifer Characterization Report.

7. The Aquifer Characterization Report states that no consistent ground water gradient (page 4-11) is present at the Ekotek site and that a "back and forth movement of the site ground water" (page 5-5) may occur. If



this is the case, TCA and other contaminants may be spreading both up and down gradient from the Ekotek site and the assertion of an upgradient source may be invalid.

8. The Aquifer Characterization Report failed to consider the relative mobility of TCA, DCA, DCE, and vinyl chloride. Because vinyl chloride is the least mobile of the contaminants, it would be the least affected by the back and forth movement of ground water and would remain closest to the source. Vinyl chloride has been found in wells CH-3, CH-4, MW-6, MW-7, CH-9, CH-10, W-10, P5, and P6, all on west of the Ekotek site and not in P-12, the well near the suspected upgradient source. This pattern seems to indicate that the source of the contaminants is the Ekotek site with a westward movement of the plume downgradient from the Ekotek site. TCA is more mobile than vinyl chloride and DCA and DCE are the most mobile of these compounds. Therefore, it is understandable that more monitoring wells were found to contain DCA and DCE than the other solvents and that vinyl chloride was found in the fewest wells.

9. TCA, DCE, and DCA are heavier-than-water compounds. Therefore, their movement would not necessarily correspond to the direction of ground water flow. Their movement, in significant concentrations, would more likely be controlled by subsurface sediment geometry and permeability and the occurrence of these compounds upgradient of the Ekotek site is not definitive proof for an upgradient source. Vinyl chloride is lighter-than-water and would be the most likely contaminant to move in the direction of ground water flow. The location of wells found to contain vinyl chloride indeed suggests the Ekotek site as the source with a plume migrating toward the west.

10. To suggest that TCA did not come from the Ekotek site (page 5-1) because historic records did not indicate storage or use of the compound is meaningless. The fact that the Ekotek site did not properly document, store, or handle its wastes is the basis for the present action.

11. Further data in the area of P-13 may be required to evaluate the theory that Aquifer Units 1, 2, and 3 converge immediately west of the Ekotek site (Section 4). The potentiometric surface value used in the report is taken from a well near the Jordan River, approximately 3/4 mile from the Ekotek site. This is significant in evaluating the potential for contaminant

flow to the west.

12. Errors in Rusts presentation of data call into, question the data analysis, quality control of the work, and therefore the validity of the conclusions. The laboratory data from the "P" wells is not tabulated correctly in Appendix D. For example, the laboratory data sheets for samples collected from Monitoring Well P-12 indicate a sample was collected on March 17, 1995. in Appendix D, the tabulated data, the date of this event is listed as February 1995. Only a small portion of the data sheets were available for review. Also, in Appendix D "NA" is shown in many boxes, presumably meaning "not analyzed". Other boxes are blank, particularly for arsenic. Were these not analyzed or not reported? Table 2.5C does not show a ground water elevation for monitoring well MW-1. However, an elevation is presented in Figure 4.8.

## **Response**

See response to comment 8. EPA currently believes, based upon the sampling episodes to date, that the source of the TCA shown in P-12 is off-site. In addition, EPA believes that the data presented in the Aquifer Characterization Report is insufficient to draw conclusions regarding the source of the off-site TCA, the migration pathway of TCA, the extent of the TCA, and its potential affect upon the remediation of the Petrochem/Ekotek Site. A monitoring program will be designed as part of the selected remedy, alternative 10, to identify the impacts of this plume upon the remediation of the on-site contaminated ground water at the Petrochem/Ekotek site.

### **13.2.16 EPA's Response to Comments from the Environmental Health Division, submitted by Terry D. Sadler, Director of the Division of Environmental Health**

#### **40) Comment**

The Salt Lake City-County Health Department Division of Environmental Health (The Department) supports the USEPA's preferred alternative 7 in part. We concur with the removal of 22,000 cubic yards of contaminated surface soils and blending them with soils saturated with oily liquids (10,000 cubic yards from the debris area and 3,000 cubic yards from the oil area), provided the contaminants in these soils do not require disposal in a TSLA landfill. This action includes the removal and stockpiling of 17,000 cubic yards of clean soils from above the plume of oily liquids to remove 100% of the oily liquids for off-site thermal destruction.

We also concur with thermally treating the blended soils on-site

wherein contaminants are driven off and then destroyed. The clean soils from the stockpile area and the cleaned soils from thermal treatment will be used as backfill on the site. Additionally, 4,000 cubic yards of buried debris will be removed for off-site disposal in a TSLA permitted landfill.

Any alternative that does not remediate the entire volume of contaminated soils, all buried debris and all light, non aqueous phase liquids (LNAPL or "oily liquids") is not acceptable to The Department.

Additional information supplied by the Site Remediation committee on the complexities of the ground water regime beneath the site puts into question the advisability to include the pump and treat portion of the preferred alternative into the Record of Decision (ROD) at this time. However, evidence must be obtained that demonstrates that intrinsic remediation of the groundwater is indeed occurring and that degradation of the vinyl-chloride to a less toxic end product will occur.

#### **Response**

The selection of a remedy by EPA must meet the threshold criteria for protection of human health and the environment, and attainment of ARARs. Containment, treatment, and remedies using a combination of containment and treatment that meet the threshold criteria are suitable for selection. Thus complete remediation of the entire volume (by treatment) of waste is not necessary to achieve the threshold criteria. With respect to the selection of alternative 10 as the selected remedy, see response to comment 4. Alternative 10 addresses the commenter's concerns regarding ground water.

#### **41) Comment**

Not addressed in the current preferred alternative or in any alternative thus proposed is the contaminated clay wastes deposited by Bonus Oil on the property at 2300 North listed as the Radio Station Site and Brinkerhoff property. Somehow in the re-assignment of project managers these contaminants were overlooked as being a part of the Petrochem/Ekotek contribution to the degradation of the environment. The Department contends that the contribution of Bonus oil to both sites cannot be ignored and that clean-up must occur at this time and be included as a significant part of the final ROD.

#### **Response**

EPA conducted a Preliminary Assessment and Site Investigation (PA/SI) and sampled in January 1994 the properties known as "Radio Station Properties" and owned by Sun Broadcasting, Mssrs. Flandro and Reaveley, and Mrs. Brinkerhoff. From the

investigations, EPA concluded that these properties were not candidates for further action by EPA. The reasons are clearly specified in a letter dated April 21, 1994 from EPA to Allan W. Flandro and Clyde W. Reaveley, Karen Silver, Mrs. Keith Brinkerhoff, and Stuart E. Hunt. This letter is available in EPA's records center as part of the Site records.

**13.2.17 EPA's Response to Comments from the Ekotek Site Remediation Committee (ESRC), submitted by the office of Holland & Hart, Denise W. Kennedy, Common Counsel for the ESRC**

**13.2.17.1 Letter dated July 12, 1995**

**42) Comment**

Needless to say, the Committee is dismayed at the Preferred Alternative presented in the Proposed Plan. While we understood that EPA was not in a position to determine whether an off-site source was responsible for the ground water contamination at the Ekotek Site, we were shocked at EPA's apparent disregard of the very strong evidence in the Aquifer Characterization Report that a pump and treat ground water remedy would not only be more expensive than the more effective intrinsic bioremediation, but would be infeasible. The hydrogeology study resulting in the Aquifer Characterization Report was no small undertaking by the Committee (this effort cost in excess of \$100,000) and resulted in significant new information concerning the ground water in the area - - including further evidence that pump and treat would not be feasible. This work was undertaken by the Committee at EPA's request in its comments on the Feasibility Study and we had expected that EPA would consider it and the prior ground water information submitted by the Committee in the Proposed Plan.

**Response**

A technical review of the Aquifer Characterization Report and its subsequent incorporation into the Proposed Plan would have delayed the release of the Proposed Plan by six to ten weeks. The Proposed Plan was nearly completed when the Aquifer Characterization Report was submitted on June 19, 1995. EPA made the decision to release the Proposed Plan and invite public comment on the findings of the Aquifer Characterization Report in conjunction with public comments regarding the response actions for the site. This action does not constitute a disregard for the information in the Aquifer Characterization Report, but rather a commitment on behalf of the Agency to further the progress of this site to the implementation of a response action.

**43) Comment**

The continued reference to arsenic ground water contamination in

the Proposed Plan came as a surprise to us given comments made by EPA that it did not consider arsenic a problem. In fact, the Committee has submitted significant information and data evidencing that the arsenic levels measured at the Ekotek Site are well within background arsenic concentrations. This is further supported by information in the Aquifer Characterization Report evidencing the significant geothermal water presence. The combination of high naturally occurring arsenic in the rock and soils and geothermal water which is known to leach the arsenic from the rock/soils, results in elevated levels of naturally-occurring arsenic in the ground water. In submitting recent arsenic data to EPA demonstrating that off-site upgradient area wells exhibited arsenic concentrations many times higher than the Ekotek Site wells, we were told that EPA did not think arsenic was a concern. This, of course, flies in the face of the Proposed Plan which would lead the public or others who are not privy to all of the Site data to believe that arsenic is a significant concern at the Site.

## **Response**

The reference to arsenic in the ground water should not be a surprise to the Committee as all formal communications (i.e., written correspondence) between EPA and ESRC have detailed the debate as to whether the arsenic is natural or anthropogenic. EPA required ESRC to describe and price a contingency in the FS that would contain and treat arsenic above the MCL. The final FS submitted by ESRC on January 20, 1995 contains the arsenic contingency. As described above, the Aquifer Characterization Report was not reviewed prior to the release of the Proposed Plan. Data submitted as part of the Aquifer Characterization Report show that samples taken from the off-site piezometers upgradient of the site (e.g., P-11 and P-12) contain an order of magnitude below the MCL for arsenic. A sample from an on-site well (e.g., MW6) showed concentrations of arsenic above the MCL. And wells potentially influenced by the site (e.g., W-7, P-6a, W-10) have concentrations of arsenic above the MCL. The data from the Aquifer Characterization Report does not allow conclusions to be drawn as to whether the arsenic concentrations are natural or anthropogenic. There is evidence within the 104(e) data base that suggests that PRPs sent waste containing arsenic to the site. However, since there is insufficient data to conclude whether the anthropogenic contribution of arsenic is statistically significant, a contingency has been included in the selected remedy that will address the migration of arsenic from the site and/or the treatment of arsenic that exceeds the MCL if the concentrations of arsenic are shown to be statistically significant and site-related, i.e., not attributable to background.

It should be noted, that the public has access to all the data in EPA's possession via our Superfund Records Center.

#### **44) Comment**

The Committee's preferred alternative is Alternative 10. Figure 3 in the Proposed Plan supports the Committee's view that Alternative 10 is the most cost-effective remedy to achieve all NCP requirements. We are surprised in this day and age of emphasis on cost-effective remedies under CERCLA (or at least that has been the gist of statements made by Administrator Browner to Congress) that EPA would select one of the most expensive options available - - one that costs 170% more than an equally effective remedy.

#### **Response**

See response to comment 4.

#### **45) Comment**

While we recognize the difficulties of summarizing the risk assessment results in layman terms, we are concerned with the erroneous and potentially inflammatory language contained in the Summary sections of the Proposed Plan.

#### **Response**

With respect to the language in the Summary of Site Risks of the Proposed Plan, this language is neither erroneous nor potentially inflammatory as it explains the actual results of the Baseline Risk Assessment for the Site.

**13.2.17.2 Letter dated September 5, 1995 from the Ekotek Site Remediation Committee (ESRC), submitted by the office of Holland & Hart, Denise N. Kennedy, Common Counsel for the ESRC**

#### **46) Comment**

As requested at the Technical Meeting for the Petrochem/Ekotek Site in Salt Lake on Monday and Tuesday of this week (August 28/29), I [Robert C. Berry] am providing a summary of the equations and calculations used to estimate the maximum pumping rate sustainable before the geothermal water enters the well screen for cleanup of vinyl chloride from the fresh water aquifer at the Site. I have used both a distance of 40 feet between the well screen and the top of the geothermal water (geothermal water at 60 feet and the well screen 20 feet below the water table in the fresh water aquifer) and a distance of 20 feet between the well screen and the top of the geothermal water (geothermal water at 40 feet and the well screen at 3 feet below the water table in the fresh water aquifer). At the meeting, I presented the case for a 40-foot separation between the well screen and the top

of the geothermal water because this allows for the maximum pumping rate. The attached table presents the calculations for both the 40-foot and the 20-foot separation cases.

As the attached table shows for the case of a 40-foot separation between the bottom of the well screen and the top of the geothermal water, the most probable range of pumping rates that will prevent upconing is 20-40 gpm. This was presented at the meeting. The maximum rate would be 46.9 gpm. Therefore, the conclusion was presented at the meeting that with a well screen 20 feet below the fresh water surface and 40 feet above the geothermal water contact (case with geothermal water at 60 feet and well screen 20 feet below water table for fresh water with vinyl chloride), the maximum pumping rate to avoid geothermal water in the pumping well would be in the range of 20-40 gpm. You would still have upconing of the geothermal water, but the dome of upconed geothermal water would not reach the well screen of the pumping well. The top of the dome would be just below the well screen.

### **Response**

EPA believes that calculations provided assumes simple geology (single layer model) with an average conductivity of 100 to 300 feet/day and allows consideration of only a single well. However, the geology at Petrochem is quite complex and the use of a single layer model may be used for screening purposes, but should not be depended upon to represent the site adequately or to assist in the design and location of a proposed remediation well(s). It may be more appropriate to look at the design of several wells with shorter screens which can not be accomplished using the Schmorak and Mercado approach. For example, Figure 4-6 of the Aquifer Characterization Report illustrates the geologic complexities at Petrochem and shows that there are several layers. If a well is installed in Unit 3 (predominantly sand), a single layer model is not adequate since gravel underlies the sand, and because there is an upward component of flow in Unit 3 not due to upwelling of geothermal waters. On the other hand, if a remediation well is installed in Unit 2, it would intersect silts and clays with underlying sands with upward vertical flow. Such a system cannot be modeled using a single layer approach.

The calculations appear to have incorrectly used effective porosity instead of the dimensionless ratio of the critical interface rise ( $Z_{cr}$ ) to the saline interface/well screen distance ( $d$ ) or ( $Z_{cr}/d$ ). The referenced literature discusses appropriate values for this empirical ratio ranging from approximately 0.25 to 0.75. Use of these values will increase the upper limit of the range of calculated maximum pumping rates.

Hydraulic conductivity affects the potential pumping rate from an extraction well and well spacing required for plume capture. The

most appropriate system design depends on many factors including extent of contamination, hydraulic conductivity of aquifer materials, hydraulic gradient, and concerns regarding saline water intrusion. In general, more wells would be required for ground-water capture in low conductivity materials than in higher conductivity materials due to the limited influence of each well. If conditions permit, installation of a system in the higher conductivity areas may result in superior system performance.

Thus, although the Schomrak and Mercado is an appropriate approach for a single layer geology or to use for screening purposes, the conclusions from this approach do not eliminate a pump and treat system as a viable alternative for the Petrochem/Ekotek Site. The selected remedy, alternative 10, relies upon bioremediation/attenuation to address the contamination in the ground water beneath the Site. However, if it is demonstrated that bioremediation/attenuation is not containing the contaminants within the current extent of contamination, then EPA shall consider the use of the containment contingency which relies upon a pump and treat system.

**13.2.17.3 Letter dated September 8, 1995 from the Ekotek Site Remediation Committee (ESRC), submitted by the office of Holland & Hart, Denise W. Kennedy, Common Counsel for the ESRC**

#### **47) Comment**

Summary of Comments. As detailed more fully below, the Ekotek Site Remediation Committee (ESRC) believes that the cleanup alternative selected by the EPA, Alternative 7, is an ineffective, excessively costly and, in fact, impossible alternative to fully implement. The ESRC believes that Alternative 10, which has been characterized by the EPA as meeting all of the EPA's National Contingency Plan cleanup goals for protecting public health and safety, is the best choice for the Site.

The ESRC has demonstrated in several different ways that pumping and treating ground water at the Petrochem/Ekotek Site ("Site") will do nothing to improve ground water quality and further reduce public exposure risks. However, it could damage the aquifer in such a manner that any other ground water remediation alternative, including intrinsic bioremediation, would no longer be effective. Additionally, it was concluded by all parties at the August 28-29, 1995 workshop that off-site contamination would continue to encroach upon the Site, under a pump and treat scenario, thereby masking and cleanup efforts until such contamination is remediated to the responsible party.

#### **Response**

EPA maintains that a properly designed pump and treat system is a



viable alternative for the remediation of the ground water. See response to comment 46.

EPA would like to expound upon the stated conclusion of the August 28-29, 1995 Workshop. The parties conditioned that a pump and treat remediation of the groundwater would not succeed on-site, if the TCA off-site was shown to be a source of some of the on-site vinyl chloride. However, no conclusions can be drawn from the existing data that the TCA off-site is a source of the on-site vinyl chloride. Also, see the response to comment 39.

#### **48) Comment**

The ESRC's Aquifer Characterization Report (RUST E&I, 1995) clearly evidences that pump and treat (EPA's selected ground water remedy) will not achieve cleanup goals and will, conversely, interfere with natural bioremediation of the low level vinyl chloride contamination. Based on the site-specific data gathered to date, it is this latter alternative (bioremediation) that the ESRC believes has the most promise for effecting cleanup of the ground water. In fact, at a recent workshop meeting with many of the stakeholders at the Ekotek Site, conclusions relevant to ground water remediation were agreed to by all participants. [Text is provided that outlines the conclusions].

#### **Response**

With respect to the viability of a pump and treat system, see the response to comment 46. With respect to the selection of the remedy, see response to comment 4.

#### **49) Comment**

The EPA's elected Alternative 7 includes thermal desorption for treatment of soils. The process of thermal desorption carries with it a much higher short-term, risk to the public with no significant difference in the risk-based cleanup goal, when compared to the soil containment plan in Alternative 10. Both soil remediation alternatives achieve the risk-based cleanup goal of  $1 \times 10^{-6}$  (1 in one million), and will allow redevelopment of the property; the ESRC's alternative is not only more cost-effective, it will permit redevelopment sooner with less environmental impact and disruptions to the neighborhood than EPA's alternative.

#### **Response**

With respect to the comparison of the balancing criteria among the alternatives, see the response to comment 4.

EPA supports the redevelopment of the Petrochem/Ekotek Site that

is compatible with and does not interfere or reduce the protectiveness of the selected remedy. EPA believes that redevelopment can occur with the selection of alternative 10 as the selected remedy and has received recent interest in the property from three different parties. EPA encourages all interested parties to promote and facilitate, within their means, the redevelopment of the property.

## **50) Comment**

Risk Assessment. The summary of Site Risks in the Proposed Plan omits critical information necessary to an understanding of the potential Site risks. EPA's Proposed Plan at 5. The conservatism built into Superfund risk, assessments is legendary. These risk assessments result in numbers that grossly overstate any true risk, or risk reasonably likely to occur. For example, EPA uses a number of policy-based toxicity and exposure assumptions in its risk assessments that are then combined in the Site risk assessment. Toxicity assessment assumptions include the following:

# A substance that has been judged to cause cancer in animals is assumed to cause cancer in humans.

# In laboratory animal experiments, benign (noncancerous) tumors are assumed to be malignant (cancerous) tumors.

# In laboratory animal experiments, cancer risk observed from exposures thousands of times greater than potential human exposures are assumed to be predictive of human cancer.

# Where laboratory animal experiments have used different species (e.g., rats vs. mice), humans are assumed to be as susceptible to cancer as the species most susceptible to cancer.

# It is assumed that there is no safe exposure to any carcinogen.

Exposure assessment assumptions for ground water include the following:

# Site ground water is assumed to be potable.

# Substance concentrations in ground water are assumed to be calculated upper-bound values or the highest measured site values.

# Substance concentrations in ground water are assumed to remain constant throughout the duration of exposure.

The result of combining the many very conservative (even, unrealistic) assumptions is that Site risks may be overestimated by a factor of 100 or 1,000 or more. See "Science and Judgement in Risk Assessment" National-Research Council/National Academy of Science, 1994; Milloy, "Science-based Risk Assessment: A Piece of the Superfund Puzzle" (National Environmental Policy institute, 1995) (hereafter cited as "NEPI, 1995"); "Exaggerating Risk: How EPA's Risk Assessments Distort the Facts at Superfund Sites Throughout the United States" Hazardous Waste Cleanup Project, 1993; "A Historical Perspective on Risk Assessment in the Federal Government" Harvard School of Public Health Center for Risk Analysis, 1994.

## **Response**

EPA believes that the Summary of Site Risks within the Proposed Plan is in accordance with EPA guidance (i.e., Guidance on Preparing Superfund Decision Documents, EPA/540/G-89/007, July 1989) and adequately describes the conclusions of the Baseline Risk Assessment. With respect to the commenter's assertion regarding the conservatism of risk assessments, EPA dedicates a portion of the Baseline Risk Assessment and a chapter of the ROD to the discussion of how risk is assessed and the associated uncertainties. EPA clearly states when assumptions are conservative and maintains that conservative assumptions are necessary to ensure protection of human health and the environment.

The Baseline Risk Assessment (BRA) for the Petrochem/Ekotek Site follows accepted EPA guidance. In particular, the methodology used was based on Risk Assessment Guidance for Superfund (RAGS) (EPA 1989a in the BRA). Regarding the use of animal data, RAGS states the following on page 7-5:

"The toxicity data base for most chemicals lacks sufficient information on toxic effects on humans. In such cases, EPA may infer the potential for the substance to cause an adverse effect in humans from toxicity information drawn from experiments conducted on non-human mammals, such as the rat, mouse, rabbit, guinea pig, hamster, dog, or monkey. The inference that humans and animals (mammals) are similar, on average, in intrinsic susceptibility to toxic chemicals and that data from animals can in many cases be used as a surrogate for data from humans is the basic premise of modern toxicology. This concept is particularly important in the regulation of toxic chemicals. There are occasions, however, in which observations in animals may be of uncertain relevance to humans. EPA considers the likelihood that the agent will have adverse effects in humans to increase as similar

results are observed across sexes, strains, species, and routes of exposure in animal studies."

Chemicals that induce benign tumors also frequently induce malignant tumors, and certain benign tumors may progress to malignant tumors. Benign and malignant tumor incidence are combined for analysis of carcinogenic hazard when scientifically defensible. The Agency follows the National Toxicology Program framework for combining benign and malignant tumor incidence of a particular site. The commenter is referred to the policies set forth in the 1986 *Guidelines for Carcinogen Risk Assessment* and the 1992 draft working paper *Working Paper for Considering Draft Revisions to the U.S. EPA Guidelines for Cancer Risk*. The scientific studies used to develop the cancer slope factors for each or any of the carcinogenic COCs is available to the public. It is difficult to respond to the claim that the benign tumor data was inappropriately applied without definitive examples.

The assertion that there is no safe exposure to any carcinogen is not necessarily assumed in the BRA. Exposure to carcinogens resulting in a risk below the range of  $10^{-4}$  to  $10^{-6}$  is considered "safe."

Groundwater ingestion was considered in the BRA in accordance with the guidance. RAGS states that a pathway (in this case, groundwater ingestion) is complete if there is (1) a source or chemical release from a source, (2) an exposure point where contact can occur, and (3) an exposure route by which contact can occur. For this site (1) the groundwater is contaminated, (2) there are wells in the area and new wells may be drilled, and (3) although groundwater within a one mile radius is not currently used for domestic purposes, it is used for stock watering, has been used for domestic purposes in the past, and could potentially be used for human consumption in the future. Furthermore, the groundwater beneath the site is recognized as a potential drinking water resource by the State because it is hydraulically connected to the primary drinking water source for Salt Lake City.

Groundwater concentrations are assumed to be the 95 percent upper confidence limit of the mean or the highest measured site value, whichever is lower. Use of the 95 percent upper confidence limit of the mean is also in accordance with the guidance (RAGS, Section 6.5)

As stated in RAGS (page 6-27). "If groundwater modeling is not used, current conditions can be used to represent future concentrations in groundwater assuming steady-state conditions."

In conclusion, although there is a range of different opinions regarding risk assessments, it is EPA's current accepted guidance and policies that govern how a risk assessment is to be conducted

and the BRA for the Petrochem/Ekotek Site was performed in accordance with these guidances and policies.

## 51) Comment

Ground Water Risk is Overstated. The ground water risk is particularly overstated. While EPA agreed to use the more realistic future industrial use scenario for soils risks, it continued to use an unrealistic future residential use scenario for ground water. See Baseline Human Health Risk Assessment, Ekotek Site (EPA, 1994) ("BRA"). Future ground water use, whether industrial or residential, is extremely unlikely. A municipal water supply exists in the area, and will continue to be available into the future. Further, the ESRC has been advised that state and local authorities will not issue well drilling permits for the area surrounding the Site. Salt Lake Valley Interim Groundwater Management Plan, Utah Department of Natural Resources, Division of Water Rights (April 5, 1991). Additionally, the ground water under the Site is impacted by geothermal activity which detracts from potability. The monitoring of the ground water quality conducted by the ESRC over the course of the RI/FS and development of the supplemental hydrologic investigation shows elevated temperature and electrical conductivity (generally greater than 1,000 umhos/cm) and characteristic sulfur odor which reflects the upwelling of heated and mineralized geothermal water in the Site vicinity. This has been explained in greater detail in the Aquifer Characterization Report. Future consumption of ground water containing site-related contaminants, is an unrealistic assumption and should, at a minimum, have been more clearly stated in the Proposed Plan. It is critical that the Record of Decision ("ROD") carefully describe the conservative and, in many cases, unrealistic assumptions that underlie the BRA.

The Proposed Plan states that 8 in 10,000 residents and 2 in 10,000 workers could develop cancer from exposure to the ground water. This statement is unnecessarily inflammatory and misleading. EPA risk assessments estimate Site risk using two different levels of exposure assumptions, the Reasonable Maximum Estimate ("RME") and the Central Tendency Estimate ("CTE"). While both the RME and the CTE result in very conservative estimates of potential risk, the RME is significantly more conservative than the CTE. The RME uses upper-bound values (typically 90% - 95%) for all of the exposure assumptions that are then multiplied together to estimate total ground water risk. The CTE, by contrast, uses average values (50%) for all of the exposure assumptions (which are then multiplied together). The statement of ground water risk in the Proposed Plan is based on the RME, with no mention that risk was also estimated using the CTE. The CTE ground water risk from the BRA was  $8 \times 10^{-5}$  residents (8 in 100,000) and  $3 \times 10^{-5}$  workers (3 in 100,000), an order of magnitude less than the RME risk. EPA's own policy

documents emphasize the importance of describing the full range of risk (including the CTE) for risk management decision making. See "EPA Risk Characterization Program" (1995, memo from Carol Browner), "Policy for Risk Characterization" (March 1995), "Guidance for Risk Characterization" (February 1995); Elements to Consider When Drafting EPA Risk Characterizations (1995). Yet, EPA's Proposed Plan (and ground water cleanup alternative) did not factor in the significantly lower CTE ground water risk. The CTE is not only more realistic (albeit very conservative), than the RME, it was, apparently, the basis for the soils risk presented in the Proposed Plan, adding to the confusion created by the Proposed Plan discussion of Site risks.

Further, based on the probabilistic nature of risk assessment and the compounding of the very conservative toxicity and exposure assumptions, it is also just as likely that no one, even if exposed to the ground water, will develop cancer from the ground water.

In order to statistically detect a cancer risk of 5 in 10,000 (close to the residential ground water cancer risk specified in the Proposed Plan [8 in 10,000]), a population of 20 million people (over one tenth of the United States population) would have to be drinking and showering in the ground water from the Site for 350 days a year for 30 years (statistics per NEPI, 1995). This is particularly striking where, as here, not even 10,000 workers or residents would come into contact with the Site ground water, much less the requisite statistical sample. It is extremely important to clarify for the public the meaning and significance of the final risk numbers from the BRA. The Proposed Plan failed to do this and, therefore, misrepresents that ground water from the Ekotek Site will cause cancer in residents and workers. This is simply not the case.

## **Response**

With respect to the ground water ingestion pathway, see response to comment 50.

EPA disagrees with the commenter that the use of RME in the Proposed Plan is inflammatory or misleading. The use of RME in the Proposed Plan is appropriate and it accurately reflects the results of the Baseline Risk Assessment. The Baseline Risk Assessment for the Site was developed in accordance with the Risk Assessment Guidance for Superfund (July, 1989) ("RAGS"). This guidance states "Actions at Superfund sites should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future land-use conditions. The reasonable maximum exposure is defined here as the highest exposure that is reasonably expected to occur at a site." The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the

range of possible exposures. In general, it has been EPA's practice to rely upon the estimate of the RME to determine whether action is warranted (OSWER Directive 9355.0-30, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decision", April, 1991) . The ROD, a more detailed document than the Proposed Plan, provides the reader with both the RME and the CTE levels.

Although it is possible that "no one, even if exposed to the groundwater, will develop cancer from the groundwater," by the same token, it is also possible that several people would develop cancer as a result of exposure to the groundwater. The use of conservative factors could potentially be offset by the fact that many of the COCs do not have numeric toxicity criteria. The quantitative risks could actually be underestimated if these chemicals have adverse effects associated with them. In addition, humans may be more sensitive to some of the contaminants than animals used in the development of toxicity criteria. EPA believes that there are uncertainties associated with any quantification of risk. Sections. 3.4, 4.3, 5.3, and 6.5 of the BRA discuss uncertainties associated with the risk assessment. Page 6-8 states that uncertainties are "limitations to the risk assessment process which cannot be resolved quantitatively given the current understanding of human health and using current risk assessment methodology. These uncertainties are addressed in part by consistent application of conservative assumptions regarding the toxic effects of chemicals." It is also stated that such procedures are intended to protect human health. In some cases this may result in overestimation of risks; however, it is also likely that risks are not overestimated in all cases. The objective of a BRA is to estimate potential risks, while providing a margin of safety in an attempt to prevent underestimation of the risks. In any case, as stated previously, the BRA closely follows the most current, accepted, EPA guidance.

The Proposed Plan states that "assuming no cleanup were to occur, approximately 8 in 10,000 residents and 2 in 10,000 workers could develop cancer from exposure to the groundwater." It does not state that site groundwater "will cause cancer." The statement presented in the Proposed Plan is consistent with the findings of the BRA. The number of people required for a statistical sample has nothing to do with the fact that, in this case, the acceptable risk level is exceeded. The acceptable risk number is exceeded regardless of how many people are exposed. The ROD will state that an excess lifetime cancer risk of  $10^{-6}$  indicates that, as a reasonable maximum estimate, an individual has a 1-in-1-million additional chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under specific exposure assumptions at the site.

## 52) Comment

Site Does Not Pose Imminent and Substantial Danger. The Proposed Plan erroneously states that the Site, if not remediated, "may present an imminent and substantial danger to public health, welfare, or the environment." EPA Proposed Plan at 5. This is not true, and is not supported by the BRA. Rather, the BRA demonstrates that, considering site-related contaminants, appropriate exposure scenarios, and no remediation, the Site does not present an unacceptable risk to humans or the environment, much less an "imminent and substantial danger."

Indeed, the cancer risk estimate cited in the Summary of Site Risks for future Site workers exposed to soil is  $10^{-5}$  well within EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$ . 40 C.F.R. Part 300. At this level, EPA's own guidance indicates that no soils remediation would be required. See EPA, "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" (April 22, 1991).

Consumption of ground water does not reasonably reflect current or even foreseeable future Site conditions. One of the ground water contaminants, arsenic, is naturally occurring, as discussed further below. Site monitored levels of arsenic are, in fact, below the average naturally occurring arsenic levels measured in ground water throughout the Salt Lake Valley. Removal of arsenic from the cancer risk estimate in the BRA would reduce the cancer risk estimate by almost half (3 in 10,000). Another chemical considered in the BRA, and contributing to the unrealistically high EPA risk estimates was thallium. EPA has agreed not to pursue thallium cleanup because it determined that thallium is not representative of Site ground water conditions. Nevertheless, thallium remains in the BRA, giving it an additional measure of conservatism.

## **Response**

The accumulative site risk exceeds EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$ , so clearly the actions specified in the ROD are warranted and if not addressed, present an unacceptable risk to human health and the environment and may present an imminent and substantial danger to public health. The reasonable maximum exposure (RME) under an industrial scenario from site soils is  $9.75 \times 10^{-5}$  and the RME under the residential scenario from site groundwater is  $7.99 \times 10^{-4}$ . CERCLA 104 states that whenever a hazardous substance is released or there is a substantial threat of such a release into the environment, or there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, action is authorized consistent with the national contingency plan, to removed arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant, or contaminant at any time, or take any other response measure



consistent with the national contingency plan which is deemed necessary to protect the public health or welfare or the environment.

The selection of the remedy involves risk management decisions. The goal of the remediation is to achieve the acceptable risk range of  $10^{-4}$  to  $10^{-6}$ . This may include the remediation of all or a portion of the contaminants identified as contributing risk. The risk management decision to remediate a portion of the contaminants does not remove the contribution of risk from the unremediated contaminant(s) (e.g., thallium), but rather incorporates extenuating conditions that assist EPA in deciding which contaminants can be addressed that would achieve EPA's acceptable risk range.

### **53) Comment**

No Basis to Assess Risk Reduction Achieved by Alternatives. The Proposed Plan states that Alternatives 6 through 9 provide "the greatest risk reduction." EPA has no basis from which to make this statement. This is particularly true because EPA has not factored in risk to the remediation workers and other short-term risks associated with the selected cleanup alternative. See NEPI, 1995 (health risks to cleanup workers during remediation far outweigh risks to future Site workers or nearby residents from NPL sites). Further, residual risks have not been compared among the alternatives. Unless a comparison of residual risk is undertaken, EPA cannot simply assume that removal of contaminated material equals risk reduction. See Risk Assessment Guidance for Superfund (Volume I), Human Health Evaluation Manual, Part C (1989). As discussed further below, containment of the soils (Alternative 10) eliminates exposure to the soils and thus eliminates the risk from the soils. This achieves at least an equivalent level of risk reduction, if not more so, than EPA's selected alternative of thermal desorption.

### **Response**

With respect to risk reduction, EPA agrees that prevention or elimination of the exposure to the contaminants has the same end effect of risk reduction or elimination.

### **54) Comment**

Containment of Soils is Protective. Risk is a function of exposure and toxicity. Toxicity is the inherent ability of a chemical to cause adverse effects in receptor organisms, in this case humans. All chemicals have the ability to cause non-cancer adverse effects; some chemicals have the ability to cause cancer. Exposure describes how a person can come into contact with Site-related contaminants. In the absence of exposure there is no risk. Both alternatives eliminated exposure to the soils;

Alternative 7 by thermal desorption with its attendant risks and uncertainties, and Alternative 10 by containment. Contrary to the conclusions of the Proposed Plan, Alternative 10 (which isolates affected soil via sandwiching between clean soil layers) is as protective as Alternative 7 in terms of soil-related risk.

## **Response**

EPA agrees that in the absence of exposure there is no risk. Alternative 7 offers permanence through the treatment of the contaminants via thermal desorption while alternative 10 is equally protective, but allows waste to remain on site. Because contamination remains on site, there is a potential for risk should exposure occur.

## **55) Comment**

Arsenic is Naturally Occurring in Ground Water. Arsenic is a naturally-occurring substance in the earth's crust. The average concentration of arsenic in the rocks and soils in the earth's crust is approximately 1.8 parts per million ("ppm"). Vance, National Environmental Journal (Aug. 1995). Further, the Remedial investigation for the Site showed that there is no significant statistical difference between the concentration of arsenic in soils on-site and soils off-site. The off-site soils represent local background conditions. Soil arsenic, both on-site and off-site, averages around 10-15 ppm; there is no statistical distinction between on-site and off-site soil, suggesting that soil in the general vicinity of Ekotek is elevated in arsenic relative to the average crustal abundance value of 1.8 ppm. The similarity in arsenic concentrations in both on-site and off-site soils indicates that Site activities have not impacted Site soils and therefore could not have contributed to arsenic in ground water. For this reason, arsenic was not identified as a soil contaminant of concern ("COC") in the BRA.

EPA has accepted that arsenic is a naturally-occurring constituent of ground water in the Salt Lake Valley, based on correspondence from EPA to the ESRC. EPA letter, dated October 27, 1994. At issue is the concentration at which arsenic occurs naturally in the ground water.

Arsenic occurrences above the EPA MCL of 0.05 ppm are erratic spatially and not repeatable from one sampling event to another in any given well. Four occurrences above the MCL for arsenic have been recorded from the wells installed on-site. The early elevated levels in two of these well (W-1 and W-3) can be attributed to improper sample collection) and solids in the sample due to inadequate well development. The other two exceedances (W-1 and MW-6) were each 0.051 ppm, 0.001 above the MCL and have not been repeated since January 1994 and February 1995,

respectively. The average arsenic concentration in the fresh water aquifer under the Site based on the wells installed by the ESRC is 0.0156 ppm. The average arsenic concentration in the deeper geothermal water around the Site vicinity is 0.0232 ppm, and has been observed to range up to 0.163 ppm. See ESRC letter to EPA, dated March 9, 1995.

In addition to Site monitoring data, published water quality data for the Salt Lake Valley collected by the United States Geological Survey ("USGS") evidences arsenic concentrations ranging up to 0.360 ppm in the shallow unconfined aquifer (Unit 2), and up to 0.280 ppm in the confined Principal Aquifer (Unit 3). The average arsenic concentration in the shallow aquifer (Unit 2), based on the 51 wells sampled by the USGS, is 0.034 ppm; the average arsenic concentration in the Principal Aquifer (Unit 3) based on 33 wells sampled by the USGS is 0.029 ppm. Other arsenic monitoring data further evidences that arsenic occurs in the Principal Aquifer at levels higher than those measured at the Ekotek Site. See Runnells, Regional Geochemistry for the Great Salt Lake Area (1992)(average arsenic levels of 0.07 ppm, with values up to 0.437 ppm). These values are higher than the average for the Site wells (0.0156 ppm). All of these data taken together suggest that arsenic in ground water under the Site is within the naturally-occurring ranges in the Salt Lake Valley, and that the few elevated measurements of arsenic at the Site are within the ranges recorded by other agencies and other studies.

Rain infiltration through soil is the most likely source of arsenic in the vicinity of the Site and probably on-site. A second possible natural source is the Principal Aquifer, especially for arsenic concentrations west of the high-conductivity ridge under the Site. During the winter months, the geothermal activity is low and the Principal Aquifer can flow eastward into the Site. This accounts for higher arsenic along the west side of the Site and for generally higher arsenic values in the winter. A third and possible source is geothermal activity along the Warm Springs fault. Arsenic is considerably higher in geothermal water upgradient of the Site associated with the Warm Springs fault. The soil and Principal Aquifer sources are the more likely sources. Both are natural sources that cannot be remediated.

If the used oil present in the LNAPL were a contributing source of the arsenic, it is logical to assume that wells completed within or adjacent to the plume of oil would show the highest arsenic concentrations. However, this is not the case; the wells where elevated levels of arsenic have occurred (W-1, W-3, W-7, MW-6, P-3 and P-6A) were not spatially related to the LNAPL plume (MW-6 is completed below the water table). Further, the ESRC has performed additional testing on the LNAPL to supplement existing data. A Toxicity Characteristic Leaching Procedure ("TCLP") test

was run on the LNAPL for RCRA metals. The results show that arsenic is not leached from the substance because it was not detected in the TCLP leachate test, which had a detection limit of 0.10 ppm. These data strongly suggest that the oil is not a source of arsenic.

## **Response**

EPA believes that there is insufficient data with respect to Site ground water background data to definitively state that the concentrations of arsenic on-site are natural. EPA believes that the basis for, and implementation of, the arsenic contingency are fully described in the ROD and offer the best approach to an inconclusive feasibility study.

## **56) Comment**

Vinyl Chloride is Not a Site Source. There are presently no verified sources of chlorinated solvents on the Ekotek Site. There is no evidence of dense non-aqueous phase liquids ("DNAPL") at the Site, and no significant amounts of Site COCs in the LNAPL. Although chlorinated solvents may have been shipped to the Site, separate, discrete sources of this solvent material have not been located in the Site soils or ground water. See Feasibility Study at 2-12. Because the parent solvents have not been detected consistently in the ground water above trace concentrations (typically 0.001 to 0.02 ppm) and solvent breakdown products have been detected, there is no evidence of a DNAPL at the Site. Recent analyses of the LNAPL show parent solvent compounds at less than 0.05 ppm.

If chlorinated solvents were present as non-aqueous phase liquids ("NAPL") or in the LNAPL, concentrations dissolved in the ground water would be much higher than presently detected. Field work has shown that contaminant concentrations of greater than one percent of the aqueous solubility limit are typically associated with NAPL presence. Cohen, R.M. and J.W. Mercer, DNAPL Site Evaluation (C.K. Smoley, Boca Raton, FL, 1993). The aqueous solubilities for vinyl chloride, TCE, and TCA are 1,100 ppm, 1,100 ppm, and 480 ppm, respectively. Therefore, if a NAPL source for these chlorinated solvents existed on-site, the ground water concentrations would likely be in the range of 1 to 10 ppm, not the 0.001 to 0.02 ppm detected in the ground water or the 0.05 ppm in the LNAPL.

The recent discovery of 1,1,1-Trichloroethane ("TCA") in monitoring wells upgradient from the Ekotek Site indicates a likely source of the vinyl chloride, in the on-site ground water. TCA which yield 1,1-DCE, 1,1-DCA, and vinyl chloride as intermediates or products. McCarty, P.L., "Ground Water Treatment for Chlorinated Solvents," Handbook of Bioremediation, Chapter 5, pp. 87-116 (Norris et al. Lewis Publishers, Boca

Raton, FL., 3.994). The types of abiotic and biotic reactions are explained in detail in the Aquifer Characterization Report.

The concentration patterns of TCA, 1,1-DCA, 1,1-DCE, and vinyl chloride observed during the recent months of sampling are consistent with TCA being one source of the vinyl chloride. Ground water upgradient from the Site contains high concentrations of TCA, and this contaminated ground water is moving toward and beyond the Site. The abiotic conversion of TCA to 1,1-DCE forms a plume of 1,1-DCE within the plume of TCA. The upgradient ground water containing TCA and 1,1-DCE is less reducing than ground water at the Site because the LNAPL and other organics on-site provide substrate for anaerobic microbial activity. When the TCA and 1,1-DCE encounter the strongly reducing conditions at the Site, the 1,1-DCE is transformed to vinyl chloride and the TCA is transformed to 1,1-DCA. These conversions are known to be quite rapid under strongly reducing conditions. The low concentrations of vinyl chloride measured in Site ground water are consistent with the low levels of DCE.

The TCA appears to enter the ground water in pulses or slugs, probably in response to heavy precipitation episodes or increases in the ground water elevation (water table). The TCA from these periodic inputs is rapidly transformed, but the intermediates, including vinyl chloride, degrade at a slower rate and can be measured over a period of years.

While the presence of cis-1,2-DCE in Site ground water is another possible source of vinyl chloride, the source of the cis-1,2-DCE on-site remains unresolved and the low levels of cis-1,2-DCE (0.012 ppm to non-detect) are inconsistent with an on-site tetrachloroethene ("PCE"). The presence of TCE and PCE as NAPL would cause much higher ground water concentrations of cis-1,2-DCE and, in turn, vinyl chloride (in the range of 10% of the aqueous solubility). See above discussion of NAPLs.

## **Response**

EPA believes the source of the vinyl chloride oil site to be the LNAPL plume. In March 1995, the Light Non-Aqueous Phased Liquid (LNAPL) was re-analyzed by ESRC for halogenated volatile constituents (solvents) by purge and trap concentration (EPA Method 5030) combined with gas chromatography (GC) as described in EPA Method 8010. The LNAPL was also analyzed specifically for vinyl chloride, 1,1,1-trichloroethane and tetrachloroethylene by mass spectrometry using selective ion monitoring (SIM). Vinyl chloride was detected at 480 ppb; 1,1,1-trichloroethane was detected at 130 ppb; and tetrachloroethylene was detected at 410 ppb. Previous LNAPL analytical methods used detection limits of 10,000 ppb and found no detections because the limits were high. The compounds that were detected in the LNAPL were evaluated as to the likelihood that they would dissolve from the oil into the

ground water. Table 6.1.2.3 of the ROD shows the results of the partitioning exercise. The predicted concentrations show that the maximum concentrations of vinyl chloride, 1,1,1-trichloroethane and tetrachloroethylene have the potential to partition into the ground water at concentrations of 110 ppb, 0.55 ppb and 1.2 ppb, respectively. Upon further review, EPA derived a theoretical equilibrium partitioning of vinyl chloride from LNAPL at the site to ground water using the effective solubility of vinyl chloride (VC) in water. Data from the March 19 sampling event was used and the effective solubility of VC in water was calculated-using the simplifying assumptions of Raoult's Law which relates the effective solubility to the mole fraction of the compound in the mixture. The resulting partitioning from LNAPL to ground water, although subject to significant uncertainty, was close to the MCL of 2 ug/l. The March 1995 sampling of the LNAPL is the only sampling event where the detection limits were sufficiently low to detect the concentrations of the chemicals of concern (COCs). More studies would have to be completed to accurately describe the range of the concentrations of the COCs within the LNAPL using the lower detection limits, and to accurately estimate the mole fraction. A thorough investigation of the LNAPL has not been completed and thus there may be portions of the LNAPL that have higher concentrations of vinyl chloride, 1,1,1,-trichloroethane and tetrachloroethylene. In addition, it is likely that the LNAPL may have partitioned in greater concentrations to the ground water in the past and is currently approaching equilibrium.

#### **57) Comment**

Pump and Treat is Not a Proven Technology. Pump and treat is an ineffective technology for ground water remediation at the Ekotek Site. Numerous studies have shown that pumping ground water cannot reliably extract most organic contaminants in the subsurface. National Research Council, Alternatives for Ground Water Cleanup (National Academy Press, Washington, D.C., 1994). The extracted water can be treated effectively, but the problem is that the extraction is inefficient due to geologic complexity and chemical characteristics of organic contaminants (for example, hydrophobicity, sorption, and low aqueous solubility). Consequently, aquifers do not get remediated with pump and treat. In many cases pump and treat results in a rapid and dramatic, decline in contaminant concentration. But when pumping stops, any contaminant present as residual phases within soil pores continues to dissolve slowly into the ground water. Hasbach, A. "Moving Beyond Pump-and-Treat, " Pollution Engineering (March 15, 1993). This has been observed in hundreds of ground water systems installed around the country, and few, if any, have achieved successful remediation.

#### **Response**

With respect to the viability of a pump and treat system for the Petrochem/Ekotek Site, see response to comments 46 and 47.

#### **58) Comment**

EPA Technical Impracticability Guidance. EPA's own guidance recommends a phased approach to Site remediation and early actions to remove contaminant sources when there is a high degree of uncertainty regarding the potential outcome of ground water restoration efforts. EPA, "Guidance for Restoration," OSWER Directive 9234.2-25. The Aquifer Characterization Report clearly evidences that there is, at best, a high degree of uncertainty as to whether pump and treat will work. See Pump and Treat Conclusions from EPA workshop, supra at 2. This is consistent with the ESRC's preferred Alternative 10, which incorporates early actions to remove contaminant sources, with ongoing monitoring of the efficacy of intrinsic remediation. In its Technical impracticability Guidance, EPA, based on its experience over the past decade (1983 to 1993), suggests that achieving the required final cleanup standards may not be practicable at some sites due to the limitations of remedial technology.

#### **Response**

EPA has selected alternative 10 as the selected remedy with the ground water remediation component being conditioned upon the quantification of the bioremediation or degradation component of attenuation. The selected remedy must ensure that bioremediation/attenuation is comparable to active restoration of the ground water.

#### **59) Comment**

Site Hydrogeology. Two hydrogeologic conditions at the Site make pump and treat remediation of vinyl chloride unnecessary and infeasible: (1) the Site is situated above a ground water stagnation zone that greatly reduces the rate at which vinyl chloride can migrate off-site; and (2) the close proximity of geothermal water (40-60 feet) to the surface will cause upconing of the geothermal water when shallow ground water is pumped. The Aquifer Characterization Report explains the hydrogeology of the Site in considerable detail and contains plates and figures to illustrate the concepts summarized below. Where appropriate, relevant plates or figures from the Report are referenced.

a. Ground Water Stagnation Zone. As Figure 4.2 from the Report illustrates, the unconfined, coarse-grained aquifer (Unit 1) which underlies the Site abuts the shallow, unconfined fine-grained aquifer (Unit 2) and the deep, confined aquifer (Unit 3 or Principal Aquifer) which extends out into the Salt Lake Valley. Converging flow between the Principal Aquifer and recharge to the fresh water aquifer at the Site (Unit 1) from the

Wasatch Mountains is the principal cause of the stagnation zone, along with geothermal flow between the Hobo Springs and Warm Springs fault zones. There is also an increase in hydraulic conductivity from the fine-grained sediments to the coarse-grained gravels across the northern part of the Site, which contributes to the decrease in hydraulic gradient from east to west across the Site. Thus, the stagnation zone beneath the Site is the result of two factors, converging flows from the west and east and a substantial increase in hydraulic conductivity due to the presence of gravels beneath the Site. The volume of recharge to the unconfined aquifer from the Principal Aquifer is unknown, but is thought to be considerably less than recharge from the Wasatch Mountains.

There is evidence based on the movement of the 1,1-DCA plume that the net movement of the plume is severely limited. Sampling of 1,1-DCA has shown that this plume is severely limited. Sampling of 1,1-DCA has shown that this plume moves back and forth on a seasonal basis and has not migrated from beneath the Site. During the late spring months, water flowing into the stagnation zone from the east (Wasatch Mountains) due to spring runoff causes the DCA plume to move to the west. But during the winter months, the lull in geothermal activity allows flow from the confined part of the Principal Aquifer to the west to flow into the Site, thus pushing the 1,1-DCA plume back to the east. Graphics illustrating this "sloshing" and the hydrodynamics of the stagnation zone in the fresh water aquifer beneath the Site are found in the Aquifer Characterization Report (Figures 4-2, 4-7, 4-10). This would not be the case if ground water from the Principal Aquifer were a continued large volume source for the Site fresh water aquifer.

The upwelling geothermal water along the Hobo Springs fault zone appears to be the controlling influence on the amount of water that can flow from the Principal Aquifer into the Site fresh water aquifer. Increased geothermal activity along the fault zone can temporarily close the connection between the Site fresh water aquifer and the Principal Aquifer. Water that does flow into the Site fresh water aquifer either from the Principal Aquifer or by recharge from the Wasatch Mountains can cause a depression in the fresh water: the geothermal water contact can absorb the increase in mass of water beneath the Site. Alternatively, some of this inflowing water may eventually flow out of the Site to the north or northwest, following the regional gradient in this part of the Salt Lake Valley. Fine-grained sediments north of the Site probably slow the northward outflow from the Site, thus contributing to the stagnation zone found beneath the Site.

The presence of the stagnation zone means that contaminants can enter the Site fresh water aquifer from either the west or the east. These contaminants will collect in the stagnation zone.



To the west is the confined part of the Principal Aquifer. An unconfined part of the Principal Aquifer exists beneath the Site. To the east are found additional industrial sites and then the Warm Springs fault and the Wasatch Mountains. Water entering the stagnation zone is accommodated both by additional depression in the contact surface between the fresh water and the geothermal water and possibly by some northward flow or leakage from the stagnation zone, especially during periods of high influx to the stagnation zone.

As discussed above, and based on the data developed in the Aquifer Characterization Report, the current contaminant plume appears to be limited to the stagnation zone. Thus, pump and treat is not required to control the plume of vinyl chloride beneath the Site.

b. Upconing of Geothermal Water. To effectively remove vinyl chloride from the Site, capture wells will have to be screened completely through the fresh water aquifer down to the contact with the geothermal water, a distance of approximately 40-60 feet. To produce effective capture, three wells will probably be needed with a minimum drawdown of 0.5 feet in the fresh water aquifer water table. Based on the pumping test performed at the Site, a pumping rate of 125 gpm would be necessary to create 0.5 feet of drawdown. This pumping rate multiplied by three pumping wells is 375 gpm, or 16,200,000 gallons per month. This value is four times the original estimate of 4,000,000 gallons per month discussed with the POTW (and on which EPA's Alternative 7 is based). This will cause upconing of the geothermal water into pumping wells following the Ghyben-Herzberg principle (see Fetter, C.W., Jr, Applied Hydrogeology (Merrill Publishing Company, Ohio, 1980)).

The amount of upconing will depend on the pumping rates and proximity of the well screens to the geothermal water contact. Assuming a maximum density for the geothermal water of 1.025, upconing of 20 feet is possible and this would mean that half of the water pumped in a well with a screen length of 40 feet that is set just above the geothermal water contact would be geothermal water. If the density of the geothermal water is less, then more upconing is possible. Even at shallow screen depths (20 feet) upconing will occur. The equations of Schmorak, and Mercado (1969) as presented and utilized by Walton, Practical Aspects of Ground Water Modeling (National Water Well Assn. 1988) show that the maximum pumping rate for a well with a screen 40 feet above geothermal water (screen depth of 20 feet with geothermal water at 60 feet) would be about 20 gpm - 40 gpm. Any pumping rate greater than about 40 gpm. would result in the upconing geothermal water entering the well screen. The minimum total pumping rate to achieve a 0.5 foot depression in the fresh water aquifer table would be around 375 gpm, as shown above.

This means each of the three wells would need to pump at a minimum of 125 gpm, not the 40 gpm necessary to avoid upconing.

Upconing of geothermal water will seriously reduce the effectiveness of pump and treat for vinyl chloride and will cause increased mixing of geothermal water and fresh water. Also, geothermal water entering the fresh water aquifer would occupy mostly the large pore spaces of the sand and gravel, making it difficult to remove the dissolved vinyl chloride from the smaller pore spaces. Increased pumping would only cause more upconing and less removal of vinyl chloride.

Thus, since potential capture wells must either be pumped at a rate too low to achieve plume containment (much less capture), or pumped at a rate that will cause upconing of geothermal water, pump and treat is simply not a viable remedial alternative for the Ekotek Site.

## **Response**

EPA has selected alternative 10 as the remedy for the Petrochem/Ekotek Site which relies upon bioremediation/attenuation to address and contain the contaminants within the ground water plume within the current extent of contamination. With respect to the stagnation zone, see response to comment 7. With respect to the viability of a pump and treat system, see response to comments 46 and 47.

## **60) Comment**

Off-site Vinyl Chloride Source. As discussed above, the vinyl chloride concentrations in the ground water appear, in large part, attributable to an off-site, upgradient source. Regardless of whether off-site, upgradient source(s) are the only source(s) of the Site vinyl chloride (as the ESRC believes), or a contributing source, the off-site source(s) must be addressed before remediation of the Site ground water can be undertaken. This is particularly true with pump and treat, since pumping would only exacerbate migration of the off-site plume into the ground water under the Site by increasing the ground water gradient in the fresh water aquifer and thereby increasing the flux rate of contaminant into the Site.

## **Response**

With respect to the off-site TCA being the source of the on-site vinyl chloride, see response comment 39. With respect to the source of the vinyl chloride on-site, see response to comment 56.

## **61) Comment**

Naturally Occurring Arsenic. Pump and treat will not work for

arsenic remediation because: (1) there is no consistent arsenic contamination at the Site, and (2) the most likely sources for arsenic, the soil and possibly the Principal Aquifer, are natural sources. Pump and treat will not stop rain water infiltration through soil from adding arsenic to ground water. Pump and treat may, especially during the winter months, degrade the water quality by pulling in more water from the Principal Aquifer that is elevated in arsenic (average of 0.07 ppm with values up to 0.437 ppm). Runnells, 1992.

Removal of arsenic by pump and treat cannot attain a clean-up goal because the fresh water aquifer at present averages below the MCL. Elevated arsenic levels are sporadic spatially and not repeated in time. In short, there is no arsenic plume. Further, the ongoing natural arsenic contribution to the ground water system under the Site would result in a pump and treat system operated into infinity, with no hope of removing the naturally occurring arsenic from the aquifer. Under these circumstances, it is simply not technically feasible to attempt pump and treat to address arsenic in the ground water.

#### **Response**

With respect to arsenic, see response to comment 43.

#### **62) Comment**

POTW Limits. The Salt Lake City publicly-owned treatment works ("POTW") cannot accommodate the volume and quality of extracted water anticipated by EPA. The POTW is in the process of developing a treated water reuse program, and cannot accept large volumes of water with low concentrations of contaminants yet potentially high specific conductance and salinity (due to the geothermal influence at the Site). The higher pumping rates which would be necessary to affect the plume based on the expanded knowledge of the Site hydrogeology, as well as the geothermal upconing, as explained above, represent a higher volume of more saline water than the ESRC believes the POTW is prepared and able to accept.

#### **Response**

With respect to the POTW accepting the volume and quality of extracted water, the Feasibility Study states that ESRC has completed the necessary coordination with the POTW to determine that the quantities and quality of the ground water extracted at pumping rates of 40-100 gpm was a viable alternative (i.e., 7) worthy of consideration for selection. With respect to the upconing of geothermic waters and viability of pump and treat systems for this Site, see response to comments 46 and 47.

#### **63) Comment**

Bioremediation of Vinyl Chloride. Studies for the past 15 years have determined that many organic contaminants are biodegraded in the subsurface. This research has characterized the possible reactions and conditions that are needed for reactions to occur. This has led to interest in engineering bioremediation where chemicals such as oxygen and nutrients are added to the subsurface to stimulate bioremediation (active Site remediation).

In the past few years, it has been recognized that there are many natural bioremediation reactions occurring at waste sites. The long exposure of microorganisms in the soil to contaminants at waste sites has led to adaptation and bioremediation reactions in the soil. For aquifer restoration, the naturally occurring hydrogeochemical conditions at the Site must allow the rate of bioremediation to exceed the rate of contaminant migration. Intrinsic remediation is not a "do-nothing" approach. There must be continual monitoring to confirm the progress of contaminant bioremediation and the effectiveness of intrinsic reactions. The advantages of this approach are (1) no alternative of ground water gradients, (2) minimal disruption of the ground surface at the Site, and (3) lower cost.

The information presented in the Aquifer Characterization Report demonstrates that natural processes are controlling the contamination in the ground water at the Ekotek Site. The hydrogeology and contaminant distribution in the ground water has been delineated. Chemical analyses have been conducted that indicate electron acceptors and other reactants and products indicative of anaerobic bioremediation processes are present. A region of low redox exists in the subsurface around the Ekotek Site, as shown in figures presented in the Aquifer Characterization Report. The data and chemistry of the Site ground water are highly encouraging for intrinsic reactions of chlorinated solvents at the Ekotek Site.

As discussed in the Aquifer Characterization Report, the hydrogeology of the Site and the surrounding region create a stagnation zone or area of convergence beneath the Site, when westward-flowing ground water from the Wasatch Mountains meets eastward-flowing ground water from the Principal Aquifer. The zone of stagnation has helped to contain the plume of chemicals. There is no significant migration of the plume off-site, and the plume, in fact, tends to expand and contract with seasonal variations in area of convergent flow.

The initiation of pump and treat will have an adverse impact on the conditions currently favorable to intrinsic bioremediation. The pumping will create a hydraulic gradient toward the Site, causing the influx of more oxygenated and less reducing ground water, which will decrease the effectiveness of the current Site conditions in naturally reducing the contaminant concentrations.

Because the vinyl chloride plume lies within the stagnation zone, the potential for migration has been greatly reduced. The vinyl chloride plume is slowly but noticeably decreasing in concentration due to bioremediation. The very low concentrations of vinyl chloride increased in some wells near the northern extent of the Site in 1995, but this was expected given the recent migration of TCA into the area. Bioremediation will not change the Site hydrology or chemistry, and thus will allow the current reducing conditions at the Site to continue the degradation and reduction in level of vinyl chloride. In contrast, pump and treat of the vinyl chloride will not only fail to recover the vinyl chloride, it will alter the reducing conditions at the Site and possibly prevent the natural bioremediation from continuing. The ESRC strongly believes that natural bioremediation must be given a chance to work. Long-term vinyl chloride monitoring (10 years) to confirm or refute natural bioremediation is the only viable option given all of the evidence indicating pump and treat will not succeed.

## **Response**

Alternative 10, the selected remedy, relies upon bioremediation/attenuation to address the contaminants within the ground water beneath the Site. With respect to bioremediation/attenuation of the contaminants within the ground water underneath the Site, see response to comment 33. With respect to the stagnation zone, see response to comment 7. With respect to the viability of a pump and treat system on the Site, see response to comments 46 and 47.

## **64) Comment**

No Current Exposure to Ground Water. A well survey was performed during the RI/FS to locate any existing wells in the vicinity of the Site. Records from the Utah Division of Water Rights were obtained and reviewed, and a field survey was performed, to determine the exact location of each well within one mile of the Site. There are no wells being used for domestic drinking water. Remedial Investigation at 3-6, Table 3.4, Figure 3-8. As the above-referenced Attachment 3 indicates, there is a moratorium on the drilling of any wells into the Principal Aquifer when a municipal water supply is available. The municipal water system is available in the entire vicinity of the Ekotek Site. Thus, at this time, there is no current exposure to the ground water, nor is any allowed until the moratorium is lifted.

## **Response**

The ground water beneath the Petrochem/Ekotek Site is considered a potential drinking water source by the State of Utah. As such, the remedy described in the ROD shall return this ground water to its beneficial use as a drinking water source within a reasonable

timeframe given the particular circumstances of the site as specified in the selected remedy.

#### **65) Comment**

Intrinsic Bioremediation is Only Viable Alternative. In light Of the foregoing analysis and discussion, intrinsic remediation is the only technically feasible alternative available to address the low levels of vinyl chloride in the Ekotek ground water. Of course, the efficacy of intrinsic bioremediation cannot be established conclusively until the off-site, upgradient TCA source is eliminated.

At the EPA workshop meeting on August 28-29, 1995 in Salt Lake City, EPA seemed to indicate that without absolute proof that bioremediation was occurring at the Site, it would, by default, select pump and treat for ground water cleanup. As the ESRC explained, and as EPA's experts agreed, the very low levels of vinyl chloride, relative to the analytical detection limits and other contaminated sites, makes it difficult to establish with any higher degree of certainty that bioremediation is indeed occurring at the Site. Further, as set forth above and as EPA's experts agreed, there are significant concerns with the effectiveness of pump and treat in the unique hydrogeologic, regime of the Ekotek Site. Under these circumstances, then, when (1) no one is currently exposed to ground water, (2) the vinyl chloride levels are very low, (3) the plume is migrating very slowly, if at all, (4) pump and treat might disrupt bioremediation, and (5) the Site conditions are conducive to bioremediation, it would be arbitrary and capricious for EPA to select pump and treat simply because bioremediation cannot be proven to a level of scientific certainty.

#### **Response**

The commenter misrepresents the degree to which EPA's experts agreed with ESRC regarding pump and treat systems and the necessity of acquiring more information to quantify bioremediation at the Site.

It is more accurate to state that at the Workshop meeting August 28-29, 1995, EPA acknowledged that there is some difficulty in quantifying the degradation rate of the on-site vinyl chloride to ethane and ethene, but to state, imply or conclude that EPA's experts believe that the degree of certainty that bioremediation is occurring at the site cannot be further established is completely wrong. EPA's experts stated that although ESRC can show that conditions are favorable at the Site for bioremediation, ESRC cannot conclude that bioremediation is occurring until the rate of degradation of the vinyl chloride to ethane and ethene is quantified. Much discussion then took place as to the difficulties of obtaining sampling methods with low

detection limits and the strengths and weaknesses of approaches used to quantify bioremediation. After the meeting, ESRC representatives met with EPA to develop an approach for the quantification of bioremediation. ESRC has already initiated the first two activities and the ROD describes the follow-up activities under the description of pilot studies.

With respect to conclusions regarding pump and treat systems, EPA's experts listened to the presentation and engaged in questions and acknowledged that all pump and treat designs must consider site conditions. Beyond these conclusions, ESRC is greatly misrepresenting the outcome of the meeting to conclude that EPA believes the selection of a pump and treat system would be an arbitrary and capricious decision. During the meeting, EPA asked that ESRC provide the basis of the calculations and conclusions being presented regarding the upconing of the geothermal waters. ESRC provided these calculations in a letter dated September 5, 1995. EPA's review and response to this letter is found in the response to comments 46 and 47.

In conclusion, the selection of bioremediation/attenuation relies upon the ability of the Respondents performing the response action to quantify the rate of bioremediation to demonstrate that bioremediation/attenuation is comparable to an active restoration program. If bioremediation/attenuation does not contain and remediate the contaminants within the ground water plume, EPA will consider other remediation technologies. The containment remedy, which is a pump and treat system, has been developed to ensure containment of the contaminants if bioremediation/attenuation fails.

#### **66) Comment**

Containment of Soils is Fully Protective. The National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") states that "EPA expects to use 'treatment to address the principal threats posed by a site, wherever practicable' and 'engineering controls, such as containment, for waste that poses a relatively low long-term threat.'" 40 CFR Section 300.430(a)(1)(iii). EPA's guidance document, "A Guide to Principal Threat and Low Level Threat Wastes" (OSWER 9380.3-06FS, November, 1991), defines principal threat wastes as those source materials considered to be highly toxic or highly mobile which pose a potential risk of  $10^3$  or greater. According to the guidance, low-risk wastes with risks less than  $10^{-3}$  can be reliably contained and would present only a low risk in the event of release.

Thus according to EPA's own guidance, containment of soils at the Site would be protective, since the Site soils fall within EPA's definition of low-risk wastes. The Proposed Plan is inaccurate when it states that "Alternatives 6 through 9 are more protective than the other alternatives" since Alternative 2 through 5 and 10

have elements of containment and treatment which isolate or remove low-risk soils and prevent exposure.

Containment has been selected by EPA at many other sites as meeting the requirements of the NCP and being fully protective (at least 50 sites involve containment in the available ROD data base). Specific examples where EPA has selected containment include the Peak Oil/Bay Drums site in Brandon, Florida, where ex-situ stabilization and solidification were selected to address lead in soil, followed by on-site containment. It is noteworthy that in the Peak Oil ROD, EPA made the following statement: "Based on the industrial character of the facilities surrounding the Bay Drums site and the expectation that the area will remain industrial in the future, EPA determined that a cancer risk of 1 for a current worker scenario is appropriate for the site." Peak Oil ROD, Operable Unit 3, at 44 (1993).

Selected other RODs for which EPA has chosen containment as part of the remedy include the Laskin Poplar Oil Site (Ohio), the Old Inger Refinery (Louisiana, refinery waste reclamation), the Swope Oil and Chemical Site (New Jersey, oil and chemical reclamation) the Waste Disposal Inc. Site (California), the Purity Oil Site (California), and the Sharon Steel Site (Utah). In the Laskin Poplar Site ROD, EPA states that "[i]n the judgement of the U.S. EPA, the principal threat at the site is being addressed by the treatment portion of the Source Removal Operable Unit with a remedial action that primarily contains the remaining contaminants." Id. at 38. EPA's selected remedy for the Old Inger Refinery Site, a former refinery waste reclamation facility, also incorporated on-site treatment of heavily impacted soils and water (land treatment and carbon adsorption) while using containment for "slightly contaminated soils" which would "provide adequate protection to public health and environment." Id. at 20.

At the Swope Oil and Chemical Site, a RCRA cap was deemed protective after excavation and off-site disposal of shallow soil contaminated with solvents and PCBs. At the Waste Disposal Inc. Site in California, contaminated soil will be consolidated under a RCRA-equivalent cap and institutional controls will be used to prevent exposure. At the Purity Oil Site in California, containment was selected as part of the remedy to prevent exposure to soils. At the Sharon Steel Site in Midvale, Utah, after selective excavation and consolidation of soils, a five-foot cap will be placed over the site. EPA has deemed the Sharon Steel selected remedy (and contingency remedy of removal and off-site disposal) "protective of human health and the environment Id. at 4.

These are just a few of the many NPL sites at which EPA has determined that containment of low-risk soils is protective of human health and the environment.



The ESRC's preferred alternative, Alternative 10, includes isolation of low-risk Site soils under a clean soil cap of 42 inches. This cap thickness was selected based on a typical frost depth in the Salt Lake City area (approximately 30 inches) and the typical practice under Salt Lake City building codes of excavating approximately 12 inches below frost depth for utility placement. A cap thickness of 42 inches thus would prevent exposure under future typical building scenarios, to the maximum anticipated depth of excavation; it is therefore protective, and will not hinder future redevelopment of the Site.

## **Response**

With respect to the selection of the remedy, see response to comment 4.

## **67) Comment**

EPA's Selected Soil Remedy (Thermal Desorption) is Not Warranted. The cost and logistics of thermal desorption are not justified at the Petrochem/Ekotek Site, because, as discussed above, the calculated soil risks are already within EPA's defined acceptable risk range and the soil is classified as low-risk material. Because the soils do not currently present an unacceptable risk, thermal desorption represents an excessive remedy that is more than needed and is, therefore, not cost effective.

Further, thermal desorption will present short-term impacts to the neighborhood such as visual disruption, increased traffic, noise, and potential odors which are unnecessary. The Site is located in an air quality non-attainment area, and even over the relatively short time period of thermal desorption, there is the potential for impacts to air quality.

## **Response**

With respect to the selection of the remedy, see response to comment 4.

## **68) Comment**

LNAPL. The Proposed Plan is inaccurate in stating that 100% removal of the LNAPL will be accomplished. The FS actually states that "[d]irect excavation is anticipated to remove as much of the LNAPL as feasible..." EPA must recognize the uncertainties and changing conditions that may be encountered under actual construction conditions in the field, and that "100% removal" of the LNAPL is not possible due to the practicalities of remediation. The direct excavation of LNAPL is only envisioned as an effective means for capturing the majority of the recoverable LNAPL in the areas of the Site where the greatest mass of oil is located. The excavation of soils close to the

water table will involve excavation of water along with the oil and soil, and a dewatering pad will be required to allow drainage of the water back into the excavation. The withdrawal of water will create a hydraulic gradient toward the excavation, which will tend to allow the LNAPL to move toward the excavation for collection through skimming. This will also tend to make the walls of the excavation unstable, constraining the design of the excavation and making it essential to concentrate on that portion of the LNAPL plume with the most recoverable oil per volume of soil removed. The sides of the excavation will have to be sloped and benched to provide the stability for an excavator to remove the soil, and this will physically limit the area available for excavation. Even with these design constraints, direct excavation is still the most effective method for capturing the greatest amount of recoverable LNAPL.

## **Response**

EPA recognizes that 100% removal of the LNAPL is not technically feasible, however, EPA believes that the use of percentages is a good communication tool to present the goals of the LNAPL removal. The use of these percentages in the Proposed Plan does originate from the use of these percentages in the feasibility study. The ROD discusses the techniques that will be used to remove the LNAPL (e.g., trenches, skimming, direct excavation) and also provides a definition of extractable LNAPL (e.g., extractable LNAPL is defined as measurable LNAPL greater than 0.02 ft in thickness).

The selected remedy, alternative 10, contains 100% of the removal of the LNAPL. The goal of removing as much LNAPL as technically feasible, or 100% of the LNAPL, will be fully described in the development of the remedial design of the remedy.

## **69) Comment**

Buried Debris. The ESRC's preferred alternative (Alternative 3.10) addresses buried debris to an equivalent level as EPA's preferred Alternative 7, and does so in a manner that provides flexibility and cost-effectiveness. Both alternatives remove the buried debris and soil over the concrete slab, and provide for either on-site treatment or off-site disposal of the material. While Alternative 7 provides costs for additional excavation to the water table, with all excavation and removal activities conducted under a vapor dome, Alternative 10 allows the remedial contractor to explore beneath the concrete slab to determine exactly how much additional material removal is necessary. The costs presented for Alternative 10 reflect a contingency to allow for all necessary excavation. The potential for odors will be controlled under Alternative 10 with foam application, which is a more cost-effective approach in the control of potential odors and as protective as a vapor dome. Thus, with respect to the

buried debris, the Proposed Plan is inaccurate in stating that Alternative 10 does not achieve the same long-term effectiveness and permanence as Alternatives 6 through 9.

## **Response**

The cost estimates for Alternatives 7 and 10 differ in the buried debris area with respect to the volume of LNAPL-saturated soil that will be disposed in a TSCA-permitted landfill. Alternative 7 identifies 4,000 CY while Alternative 10 identifies 2,000 CY of LNAPL-saturated soil. This leaves the impression that alternative 7 is addressing more of the waste than alternative 10. However, alternative 10 does include a contingency to provide for further excavation. EPA agrees with the commenter that alternative 10 includes the excavation of all soils within the buried debris area that exceed the soil hot spot criteria and/or are saturated with LNAPL. The remaining soils within the risk range of  $10^{-4}$  to  $10^{-6}$  will be contained on-site beneath a 42 inch clean soil cover. The integrity of the cap relies upon continued inspections and maintenance. Alternatives 6 through 9 treat all the contaminants within the buried debris and do not rely upon further inspections or maintenance thus their permanence and associated long-term effectiveness is greater than alternative 10.

## **70) Comment**

EPA Must Properly Consider Cost in Selecting Its Preferred Alternative. In its Proposed Plan, EPA compares the remedial alternatives set forth in the Feasibility Study with the 9 evaluative criteria set forth in the NCP. 40 CFR Part 300 (1994). EPA's regulations divide the NCP criteria into (1) threshold criteria (protection of human health and the environment, and compliance with applicable or relevant and appropriate requirements ("ARARs"), (2) primary balancing criteria (long-term. effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost), and (3) modifying criteria (State and Community acceptance). 40 CFR 300.430. As a threshold matter, any remedial alternative selected must provide overall protection of human health and the environment and comply with ARARs. The alternatives are then compared to the five primary balancing criteria; in contrast to the threshold criteria, a remedial alternative need not meet all of the balancing criteria to be selected. As a final check on a selected alternative, State and Community acceptance must be considered.

As Figure 3 in the Proposed Plan indicates, EPA has determined that both the Committee's preferred alternative, Alternative 10, and the EPA selected alternative, Alternative 7, meet the NCP threshold criteria. EPA also concludes that both Alternative 7

and 10 meet the primary balancing criteria. EPA, however, has gone beyond a determination of whether an alternative meets the NCP requirements, it has used a check mark to denote compliance and a plus sign for "full" compliance. There is no provision in either CERCLA or the NCP for the distinction between a check mark and a plus sign.

Once it is determined that an alternative meets one of the NCP criterion, further comparison as to whether it meets the criterion more or less than another alternative is an exercise in subjectivity that does not further NCP cleanup objectives. This is particularly true where, as here, the comparison does not evaluate cost. EPA's Proposed Plan simply lists the estimated cost for each of the alternatives, rather than attempting any kind of comparison. However, a quick review of Figure 3 in the Proposed Plan indicates that Alternative 10 is by far the most cost effective of the ten alternatives. For \$10.5 million less than the EPA proposed remedy, all NCP criteria can be met. Thus, at a minimum, the NCP cost criteria for Alternative 10 must be weighed against Alternative 7. There is simply no evidence in the Proposed Plan that this comparison was undertaken.

In selecting a cleanup alternative that is \$10.5 million more than an alternative that meets all NCP criteria, EPA has not only failed to apply the cost primary balancing criterion, it has ignored the dictate of CERCLA 121(b)(1) that requires remedies to be cost-effective. The NCP specifies that once a remedial action meets the threshold criteria (protects human health and the environment, and meets ARARs), its cost effectiveness must be determined. 40 CFR 100.430(f)(1)(ii)(D). Cost effectiveness is determined by comparing long-term effectiveness, treatment, and short-term effectiveness with cost. Id. EPA acknowledges that both Alternative 7 and 10 provide long-term effectiveness, treatment and short-term effectiveness. Alternative 10 is, however, 63% less expensive than Alternative 7 -- it is clearly more cost effective than Alternative 7. Yet EPA inexplicably selected the more costly alternative with no attempt to address the remedy's cost effectiveness. In fact, EPA's Proposed Plan document is noticeably silent on the issue of cost effectiveness or cost.

When all statutory criteria for remedy selection are considered, including EPA's omitted cost effectiveness, Alternative 10 stand out as the one remedy that in EPA's own analysis meets all NCP criteria and is significantly less expensive than the other alternatives, particularly the EPA preferred Alternative 7. As the Court in Ohio v. EPA, F.2d 1520 (D.C. Cir. 1993), stated, "there is nothing in [CERCLA] Section 121 to suggest that selecting permanent remedies is more important than selecting cost-effective remedies." Id. at 1532. EPA must reconsider its selection Of Alternative 7 in light of the statutory and regulatory emphasis on cost effectiveness, and its failure to

consider or address those issues in the Proposed Plan.

## **Response**

With respect to the selection of alternative 10 as the selected remedy, see response to comment 4.

### **71) Comment**

**Alternative 10 Is Preferable to Alternative 7 When Pump and Treat Concerns are Considered.** Based on the text of EPA's draft Proposed Plan it appears that EPA's rationale for ranking Alternative 7 higher than Alternative 10 for the protectiveness and ARARs threshold criteria, even though both meet the criteria, is based on its determination that pump and treat is a more effective ground water cleanup technology than intrinsic bioremediation. However, as the foregoing comments well evidence, the opposite is in fact true, and particularly so at the Ekotek Site. Intrinsic bioremediation is the only potentially effective ground water technology for cleanup of the ground water whereas all of the evidence indicates that pump and treat will not be effective. Thus, based on the EPA information, it appears that Alternative 7 should receive a minus in the protectiveness and ARARs column or, at a minimum, a check mark. This revision, coupled with a true weighing of cost, would result in Alternative 10 actually ranking higher than Alternative 7.

## **Response**

With respect to the viability of a pump and treat system at the Site, see response to comments 46 and 47. With respect to bioremediation/attenuation, see response to comment 33.

### **72) Comment**

**Containment of Soils is Consistent with NCP Requirements.** Alternative 10 not only meets the NCP selection criteria, but it complies with the NCP expectations criteria. The NCP identifies the following relevant expectations that EPA "shall consider...in developing appropriate remedial alternatives":

- (A) EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic compounds, and highly mobile materials.
- (B) EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat or where

treatment is impracticable.

40 CFR 300.430(a)(1)(iii).

Subsequent to promulgation of this regulation, EPA issued guidance clarifying principal threats and low level threats. EPA, "A Guide to Principal Threat and Low Level Threat Wastes" (OSWER, Nov. 1991). This guidance clarifies that the low level and principal threat distinction applies to source material such as contaminated soil or floating product an ground water. While the guidance states that no threshold risk level has been established to equate to principal threat, it states that "a potential risk of  $10^{-3}$  or greater" would suggest treatment. In general, principal threat wastes are liquids or highly mobile or toxic wastes. Low level threat wastes, in contrast, are those

that generally can be reliably contained and that would present only a low risk in the event of release. They include source materials that exhibit low toxicity, low mobility in the environment, or are near health-based levels.

Guidance at 2. An example provided in the Guidance of low level threat waste is soil with contaminant concentrations that present an excess cancer risk near the acceptable risk range. *Id.* at 2. The excavated Site soils at Ekotek clearly fall within this description. The overall excess cancer risk from Site soils, before hot spot removal, is  $1 \times 10^{-5}$ , which is not just near the acceptable risk range, it is well within it. The more mobile LNAPL at the Site will be removed and treated off-site, thus also failing squarely within EPA's NCP expectations.

EPA's apparent disregard for its own regulations and interpretive guidance in selecting a preferred alternative at the Ekotek Site is nothing short of arbitrary and capricious. Alternative 10 presents an effective, safe, and efficient remedy that fully complies with all statutory and regulatory criteria -- and is \$10.5 million cheaper than EPA's selected alternative.

## **Response**

With respect to the selection of alternative 10 as the selected remedy, see response to comment 4. As clarification, the reasonable maximum exposure (RME) under an industrial scenario from site soils is  $9.75 \times 10^{-5}$  and the RME under the residential scenario from site groundwater is  $7.99 \times 10^{-4}$ .

## **73) Comment**

The Ekotek Cleanup Is An Opportunity for EPA to Demonstrate Its Commitment to Superfund Reform. As the recent debates over

Superfund reform (both administrative and legislative) evidence, one of EPA's main failings in implementing Superfund has been its continued failure to consider cost in its remedy selection process. While EPA gives lip service to cost and lists it as one of the NCP evaluative criteria, it simply does not truly give equal weight to cost in making its remedy decisions.

As discussed above, Figure 3 in the Proposed Plan illustrates this. While the alternatives are ranked for six of the seven NCP criteria, EPA did not rank the alternatives for cost. Yet to provide a meaningful comparison, costs must also be weighed. Those alternatives, including Alternative 10, with lower cost estimates should be ranked higher under cost than those alternatives with higher cost estimates, including Alternative 7. It is not, as EPA indicates, a matter of comparing two alternatives that both meet the NCP requirements with the selected alternatives simply doing a better job of meeting those requirements; it is a matter of two alternatives that both meet the requirements and one is significantly more cost effective than the other by a factor of nearly three times.

Selection of Alternative 10 as a cleanup remedy for the Ekotek Site would not only comply with all statutory requirements, it would send a message that EPA is serious about its desire to reform its implementation of Superfund, that it does not need Congress to beat it over the head with the requirement that remedies be cost effective, and that it intends to comply with the NCP and CERCLA Section 121 in selecting cost-effective remedies.

## **Response**

With respect to the selection of alternative 10 as the selected remedy, see response to comment 4.

**13.2.17.4 Letter dated September 14, 1995 from the Ekotek Site Remediation Committee (ESRC), submitted by the office of Holland & Hart, Denise N. Kennedy, Common Counsel for the ESRC**

## **74) Comment**

On behalf of the Ekotek Site Remediation Committee, this letter is a formal request that the United States Environmental Protection Agency undertake an immediate investigation pursuant to EPA's relevant statutory and regulatory authorities, including but not limited to Sections 104 and 106 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, to identify and remediate the source of the Trichloroethane ("TCA") that is migrating into the ground water under the Ekotek Site from an upgradient source. As the August 28-29, 1995 workshop meeting indicated, any efforts to achieve ground water cleanup at the Ekotek Site through inherent

bioremediation or other means will be impeded and constrained by this off-site source is addressed, it will continue to increase the vinyl chloride levels being measured at the Ekotek Site. We urge your immediate attention to this problem and request that prompt emergency action be taken.

## **Response**

EPA has exercised its authorities under CERCLA Section 104(e) to make inquiries as to possible sources of the TCA; packages describing the information available is currently being reviewed by RCRA within EPA and the State of Utah; and the selected remedy, alternative 10, includes enhanced monitoring at the north and northwestern portion of the Site to gain a better understanding of the TCA's impact upon the Site remediation.

**13.2.17.5 Letter dated October 23, 1995 from the Ekotek Site Remediation Committee (ESRC), submitted by the office of Holland & Hart, Denise N. Kennedy, Common Counsel for the ESRC**

## **75) Comment**

The following comments are submitted on behalf of the Ekotek Site Remediation Committee (ESRC), and supplement those comments submitted on September 8, 1995. The additional comments provided herein relate to the reasonableness and practicality of the EPA's selected cleanup plan (Alternative 7) for remediating the Ekotek Site in Salt Lake City, Utah (Site). The ESRC continues to believe that Alternative 7 is not only impractical to implement, but would result in a lower level of protection at a significantly higher cost when compared to Alternative 10, if it were to be implemented. The ESRC respectfully requests, therefore, that the EPA consider the advantages of Alternative 10 including the proposed enhancements and find in favor of using the modified Alternative 10 for completing Site remediation.

## **Response**

With respect to the selection of alternative as the selected remedy, see response to comment 4.

## **76) Comment**

Enhanced Alternative 10 Soil Remedy. Since the time of its prior comments, the ESRC has met on several occasions with representatives of the Capital Hill Community group to discuss the cleanup remedies for the Site. In the course of these discussions with the Community group, the Committee considered ways of enhancing the soils portion of Alternative 10 to address concerns with the remedy. For example, the thickness of the clean soil layer on top could be increased (total layer of 6-7 feet), buffer zones could be created to ensure that the



containment area is not breached by excavation on adjacent properties. These augmentations to Alternative 10 would be reasonable, practical, and cost effective ways to ensure continued protectiveness of the soil remedy. Such an approach would best accomplish the statutory and regulatory mandates of CERCLA that cost effective protective remedies be chosen rather than defaulting to the vastly more expensive remedy of thermal desorption. This is particularly true here, where the "contaminated" soils are within EPA's acceptable risk range, and not in need of remediation.

## **Response**

EPA appreciates the suggestions presented in this comment. The suggestions, for the most part, concentrate on the aspects of the cleanup that would enhance the attractiveness of the property for redevelopment. EPA encourages ESRC to facilitate the redevelopment of the property. As a committee that is made up of numerous businesses, and by virtue of financing and performing the RI/FS the committee understands the nature and extent of the contamination, which places the committee in a unique situation to influence redevelopment.

## **77) Comment**

Cost Effectiveness of Soils Cleanup. As discussed at length in our September 8, 1995 comments, the ESRC is greatly concerned with the EPA's failure to consider cost in its selection of Alternative 7. The extra cost of the EPA's Preferred Alternative will not produce a corresponding health risk benefit. EPA's selection of Alternative 7 is completely at odds with its newly announced Superfund Administrative Reforms. These reforms highlight the importance of selecting cost effective remedies, with a new emphasis on cost reduction. Alternative 10 fits squarely within the new EPA guidance on Administrative Reforms.

During discussions with the ESRC, the Capital Hill Community group indicated that its concern with the soil cleanup was more a concern for future site redevelopment and the "Superfund stigma" forever associated with a site and not so much a concern about adverse health risk. While we are sympathetic with the Community group's concerns, we jointly recognized that since the community will not be paying for any portion of the remedy, cost or cost effectiveness is not the community's concern. There is no incentive for any community group to even consider cost in selecting its preferred cleanup remedy.

However, it is EPA's statutory (Section 121(a) of CERCLA) and regulatory (40 CFR 300.430(e)(9)) mandate to consider cost and cost effectiveness in remedy selection. For all of the reasons set forth in these and the ESRC's prior comments. Alternative 10

is the remedy that fits the selection criteria best and is one of several that is categorized by the EPA as adequately protective of human health and the environment. Community acceptance of that remedy is then factored in after adequacy of the remedy and costs have been considered. As the court in Ohio v. EPA, 997 F.2d 1520, 1533 (D.C. Cir. 1993) noted:

CERCLA requires the selection of remedial actions "that are protective of human health," not as protective as conceivably possible. A "risk range of  $10^{-4}$  to  $10^{-6}$  represents EPA's opinion on what are generally acceptable levels." 55 Fed. Reg. 8716 (1990). Although cost cannot be used to justify the selection of a remedy that is not protective of human health and the environment, it can be considered in selecting from options that are adequately protective.

Where, as here, the potential health risk from the soils is very minimal (and within EPA's acceptable risk range), the preference of a Community group that is not concerned with cost cannot override selection of a protective, cost effective remedy. There is no incentive for a community group to ever accept anything but the most expensive cleanup remedy.

In the ESRC's view, EPA's Brownfields initiative is an appropriate way of dealing with the Community group's concerns regarding a Superfund stigma at the Ekotek Site. To that end, we have encouraged the City, County, and State to pursue Brownfields redevelopment of the Site. The ESRC remains ready and willing to assist in that effort.

## **Response**

With respect to the selection of alternative 10 as the selected remedy, see response to comment 4. With respect to the Brownfields initiative, EPA would like to encourage ESRC to facilitate redevelopment of the property for the reasons specified in the response to comment 76. Redevelopment must be compatible with and not interfere or reduce the protectiveness of the selected remedy.

## **78) Comment**

Additional Groundwater Investigation. During discussions on September 28, 1995, between the ESRC's technical experts on intrinsic bioremediation and EPA's experts, the ESRC agreed to undertake two additional projects to further support the selection of intrinsic bioremediation as the most effective groundwater remedy. These two actions are as follows:

A. The generally accepted biogeochemical indicators of bioremediation (e.g., redox, dissolved oxygen, dissolved organic

carbon, methane, sulfate/sulfide, etc.) would be plotted in comparison with contaminant concentrations, on the same map, using various colors, to help define active areas of bioreduction. Because this task can be done with the existing data, the ESRC has begun this effort and will submit the results to EPA when completed.

B. The ESRC will make a more exhaustive effort to detect ethene and ethane. This time a larger sample volume (160 ml or larger) will be used to lower the detection limit to a point where these substances may be detectable. Any detection of ethene or ethane (the breakdown products of vinyl chloride) in the reducing zone will positively demonstrate that bioremediation is occurring at the Site. Such a demonstration will (1) provide proof of vinyl chloride transformation, and, (2) conclusively support the selection of bioremediation as the ground water remediation procedure of choice at the Site. However, the inability to detect ethene or ethane, because the vinyl chloride from which those substances are derived is at such a low concentration in ground water to begin with, will not alter the ESRC's position regarding the use of bioremediation at the Site.

Following the completion of the above work, the ESRC has agreed to meet with the EPA and its experts to discuss the findings.

## **Response**

EPA engaged in discussions with ESRC for the purpose of developing an approach to quantify the rate of bioremediation of vinyl chloride within the contaminated ground water plume beneath the Site. The comment describes the first two steps of the approach. The steps described in the comment are expected to determine whether the degradation products (e.g., ethane and ethene) of the vinyl chloride exist at the site. The next steps, not discussed in your comment, quantify the degradation rate. The quantification of bioremediation is necessary to determine whether bioremediation/attenuation is comparable to an active restoration system. The selected remedy, alternative 10, includes a pilot study that quantifies the degradation rate of vinyl chloride to ethane and ethene.

## **79) Comment**

Flexible ROD. While the alternatives set forth in the Feasibility Study represent the ESRC's best efforts to quantify and estimate cleanup methods and costs, based on the data gathered to date, there remains uncertainty about certain Site conditions. These uncertainties could significantly affect remediation actions during actual cleanup operations. It is, therefore, important that EPA's Record of Decision (ROD) recognize the uncertainties inherent in Site conditions and the ultimate impact they may have as field work progresses. The

remedy description in the ROD should not be written in such a manner that specified details unnecessarily constrain field activities and the need to make immediate on-site decisions during remediation.

One example of the need for flexibility has to do with reasonable recovery of the floating product on the groundwater (LNAPL). The exact subsurface extent and volume of the LNAPL is not precisely known. It is likely that portions of the LNAPL plume are nothing more than a mere sheen on the groundwater. Because of the extensive soil excavation required to reach the LNAPL, it is vitally important that the portion of the ROD dealing with LNAPL removal recognize a reasonable level of recovery rather than dictate a mandatory cleanup procedure or level.

A second area of uncertainty is the buried debris. The Alternative 6 and 7 buried debris remedies are costed for full excavation down to the groundwater. However, Alternative 10 recognizes that future investigation below the concrete slab may indicate that only partial or no excavation is necessary. The ROD needs to recognize the need for flexibility to make common sense determinations as excavation is occurring beneath the concrete slab in the buried debris area. This can be accomplished by either selection of the buried debris portion of Alternative 10, or building that same flexibility into the buried debris alternative that is selected.

While these are but two examples, it is clear that the ROD for any excavation and cleanup of the magnitude planned at the Ekotek site that the ROD must be written (regardless of which cleanup alternative is selected) to allow maximum flexibility in all field decisions.

## **Response**

While EPA appreciates the suggestions for flexibility in the ROD, EPA policy requires an enforceable ROD that removes ambiguity regarding EPA's expectations of the cleanup.

## **80) Comment**

EPA De Minimis Settlement Funds. One attendee at the July 26, 1995 public meeting asked whether EPA intended to refund any of the de minimis settlement monies it had received. For strong public policy reasons, the ESRC believes EPA should not begin down the slippery slope of refunding money collected on de minimis settlements.

First, the issue is premature. The cost estimates used in the Feasibility Study and subsequent Proposed Plan are nothing more than rough estimates. Actual cleanup costs will not be known for some time. As discussed above, there are many uncertainties

associated with cleanup and any one of these could dramatically increase estimated cleanup costs.

Second, each of the parties that chose to settle with EPA had the option of joining the ESRC and taking the risk that ultimate cleanup costs would be less than estimated by EPA. The De Minimis Settlement Administrative Order on Consent clearly does not provide for refunds, nor would any party inquiring about refunds have been led to believe that refunds would be issued. De minimis settlement opportunities at Superfund Sites, particularly those issued pre-ROD as is the case with Ekotek Site, are designed to allow parties to settle out early on with the risk that on a per gallon basis they may end up paying more than parties who participate in actual cleanup activities. It would be highly unusual and unfair to refund money to de minimis settlers and, in effect, credit to those parties, the benefits of any cost savings achieved by the parties that participated in final cleanup activities. Additionally, those parties remaining involved in cleanup activities incur transaction costs not reflected in any of the cleanup cost estimates. It is to reduce the incurrence of transaction costs by de minimis parties that de minimis settlements are designed to address -- not to ensure to an absolute degree that each and every party involved at the Site pays the same per gallon amount towards cleanup costs. For these reasons, the ESRC encourages EPA to stand firm on its position that refunds are not appropriate in the context of a de minimis settlement.

## **Response**

This issue is under consideration by EPA. Current law and EPA policy do not provide for reopening of settlements for reimbursement.

**13.2.18 EPA's Response to Comments from State of Utah, Department of Environmental Quality, Division of Environmental Response and Remediation, Kent P. Gray, Director dated October 23, 1995.**

## **81) Comment**

UDEQ supports the EPA in the selection of alternative 7 as the preferred alternative for the following reasons:

- UDEQ is not only concerned with industrial risks but also with residential risks associated with the site, notably risks associated with PAHs and PCBs in the soils. These risks are associated with both current and future use. There are currently approximately 30 homes in the adjacent Swedetown area. As with other properties, UDEQ is concerned that future land use of this site could change to a residential usage, similar

to what occurred at other industrial areas in the Salt Lake valley (i.e., Valley Smelters, Sandy Smelters, Bingham Creek, etc.). As was explained in UDEQ comments on the draft Remedial Investigation Report (comments dated March 3, 1994), Salt Lake City is experiencing phenomenal population growth in the urbanized areas due to both native population growth and to a great in-migration population movement. With such population pressures, sections of the city which are now industrial/commercial cannot necessarily be assumed to be off-limits to further population encroachments.

- Utah has a Total Petroleum Hydrocarbon (TPH) guideline for soil remediation. This value is 10,000 ppm TPH for soils. The TPH guideline is currently a "To Be Considered" (TBC) under CERCLA. UDEQ feels strongly that on-site soils exceeding this value be remediated.

- For soils, a permanent solution such as the one outlined in EPA's alternative 7 must be preferred, both by EPA guidelines, and by common sense. Any kind of cap or landfill at the site would require operation and maintenance in perpetuity, and would require institutional controls. Because the protectiveness of the remedy would depend on the effectiveness of operation and maintenance and institutional controls, it is inherently less protective than a permanent remedy. See 40 CFR Part 300.430(e)(9)(iii)(A), (C), and (D).

- In addition, a cap or landfill at the site would discourage beneficial property use after cleanup is completed. UDEQ desires a site which will have a beneficial property use after the cleanup is completed. UDEQ does not want the Petrochem/Ekotek site to be a repository of contaminated materials for an indefinite future, thereby potentially placing limits on its future use and economic viability.

- Nor would such an impediment to development be consistent with EPA's new Brownfields initiative.

- The local governments (Salt Lake City and County) support a more comprehensive cleanup, and support alternative 7. Local citizens prefer removal of contamination from the site, and do not want a repository or landfill left on-site. See 40 CFR Part 300.430(e)(9)(iii)(I).

- We support this alternative because it reduces the

toxicity, mobility, and volume of contamination better than any of the other alternatives, as is required by the National Contingency Plan (NCP).

UDEQ does recognize that a permanent solution is a more expensive one. Cost is not the only factor to be weighed, however. EPA must also weigh other factors, including long-term effectiveness, permanency, and community support. Given all of these factors, EPA clearly has the discretion to select the more permanent remedy in alternative 7.

UDEQ feels that alternative 7 offers the best cleanup for the site, as this alternative proposes cleanup of the LNAPL contaminated soils, the Buried Debris-PCB, area, contaminated groundwater, and the on-site soils in a way that protects the public health and the environment, and at a reasonable cost.

### **Response**

With respect to the selection of alternative 10 as the selected remedy, see response to comment 4. With respect to industrial vs. residential exposure, alternative 10 through the prevention of exposure to contaminated soils (i.e., underneath 42 inches of clean soil) is protective for both the industrial worker and the resident. While it is true that the integrity of the cap must be maintained to ensure protectiveness, the depth of 42 inches of clean soil provides a rigid protective layer against exposure. Normal behavior by residents includes gardening and landscaping to depths generally less than 24 inches. Institutional controls would have to be imposed as to the drilling of wells or construction practices that would bring the buried contaminated soils to the surface, but these institutional controls should not prohibit redevelopment of the Site. Such controls are included in the selected remedy.

EPA has received notice of interest in the Site from three individuals. One of the individuals provided a letter of interest to EPA and the State and stated that alternative 10 provided a greater incentive for redevelopment to him than alternatives involving thermal desorption of the soils. Thus the assumption that the alternative which treats the soils provides a greater incentive for redevelopment than the alternative that contains the soil underneath 42 inch cap may not apply to the Petrochem/Ekotek Site.

### **13.2.19 Letters asking for Extensions to the Public Comment Period**

EPA received letters from (1) Salt Lake City Corporation, Sam V. Souvall, District 3, Councilmember; (2) Paul B. Anderson Consulting Geologist, Paul B. Anderson, CHNC TAG Advisor; and (3) Capitol Hill Neighborhood Council, Eric Jergensen, Chairman,

asking for an extension to the September 8, 1995 closure of the comment period. EPA responded by extending the comment period to October 23, 1995.



**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
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Citation	Description	Evaluation
<p style="text-align: center;"><b>Solid Waste Disposal Act (42 USC Section 6901, <i>et.seq.</i>)</b>  <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <i>et. seq.</i>)</b></p>		
<p>40 CFR, Part 264, Subpart N, Landfills</p> <p>UAC R315-8-14: <u>Landfills</u></p>	<p>Establishes operating and performance standards for landfills to include closure and post-closure requirements. The regulation applies to owners and operators of facilities that dispose of hazardous waste in landfills.</p>	<p>Alternatives 2, 3, 4, 5, and 10 have containment of remaining debris and consolidate and contain waste onsite that is sufficiently similar to landfilling. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities described above, as well as to the closure and post-closure of landfills.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>40 CFR, Part 264, Subpart O, Incinerators</p> <p>UAC R315-8-15: Incinerators</p>	<p>Establishes operating and performances standards for incinerators (includes thermal treatment by definition) to include closure requirements. The regulation applies to owners and operators of facilities that incinerate hazardous waste.</p>	<p>Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 have varying levels of thermal desorption (a form of incinerators, by definition in 40 CFR part 260) onsite. Because the waste to be treated is sufficiently similar to RCRA hazardous waste, the use of the regulations is well suited to the situation, therefore the requirements are relevant and appropriate to the thermal treatment components of the alternative cited in this paragraph.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
**Page 12 of 21**

Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq.</i>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <i>et seq.</i>)</b>		
<p>40 CFR, Part 264, Subpart AA, Air Emission Standards for Process Vents</p> <p>UAC R315-8-17: Air Emission Standards for Process Vents</p>	<p>Establishes operating and performance standards for air emissions from process vents. The regulation applies to owners and operators of facilities that treat, store, or dispose of hazardous waste and applies to process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10 ppm.</p>	<p>Alternatives 2, 3, 4, 5, 6, 7, 8, and 9 have varying levels of thermal desorption which may have process vents and because the gases that may be released are sufficiently similar to RCRA hazardous waste such that the use of the regulation is well suited to the situation, the requirement is relevant and appropriate to the onsite thermal treatment system. Alternatives 4 and 8 may include process vents as components of air sparging/vapor extraction and the treatment facility using UV oxidation, respectively, in the treatment of the ground water. These ground water treatment systems must meet these standards, which include standards for process vents and test methods and procedures, and are therefore considered relevant and appropriate requirements.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>40 CFR, Part 264, Subpart P, Thermal Treatment</p> <p>UAC R315-7-23: Thermal Treatment</p>	<p>Establishes operating and performances standards for thermal treatment. The regulation applies to owners and operators of facilities that thermally treat hazardous waste in devices other than enclosed devices using controlled flame combustion. Thermal treatment in enclosed devices using controlled flame combustion is subject to the requirements of subpart O.</p>	<p>Alternatives 2, 3, 4, 5, 6, 7, 8, and 9 have varying levels of thermal desorption (a form of incinerators, by definition in 40 CFR part 260) onsite. Whether the thermal desorption unit will be an enclosed device using controlled flame combustion or another type of device will be determined during the Remedial Design. Therefore, this regulation will be considered relevant and appropriate if the thermal desorption unit incorporates any device other than an enclosed device using controlled flame combustion which will be governed by the requirements of subpart O. Because the waste to be treated is sufficiently similar to RCRA hazardous waste, the use of the regulation is well suited to the situation, therefore the requirements are relevant and appropriate to the thermal treatment components of the alternatives cited in this paragraph given the condition described.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
**Page 13 of 21**

Citation	Description	Evaluation
<p style="text-align: center;"><b>Solid Waste Disposal Act (42 USC Section 6901, <i>et.seq.</i>)</b>  <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <i>et. seq.</i>)</b></p>		
<p>40 CFR, Part 265, Subpart Q, Chemical, Physical, and Biological Treatment</p> <p>UAC R315-7-24: Chemical, Physical, and Biological Treatment</p>	<p>Establishes operating and performance standards for chemical, physical, and biological treatment. The regulation applies to owners and operators of facilities which treat hazardous wastes be chemical, physical, or biological methods in other than tanks, surface impoundments, and land treatment facilities.</p>	<p>Alternatives 8 uses chemical/physical treatment of ground water via UV oxidation in a treatment facility that is not considered a tank, surface impoundment or land treatment facility. Alternative 4 uses physical treatment of ground water via air sparging/vapor extraction which will not use a tank, surface impoundment or land treatment facility. Alternative 2, 3, 5, 6, 9 and 10 may use the enhancements to the biological treatment of the ground water via intrinsic remediation/attenuation which will not occur in a tank, surface impoundment or land treatment facility. Because the chemical, physical and biological treatment is sufficiently similar to RCRA hazardous waste such that the use of the requirement is well suited to the situation, the requirement is relevant and appropriate to the alternatives cited in this paragraph.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
**Page 14 of 21**

Citation	Description	Evaluation
<p style="text-align: center;"><b>Solid Waste Disposal Act (42 USC Section 6901, <i>et.seq.</i>)</b>  <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <i>et. seq.</i>)</b></p>		
<p>40 CFR, Part 267, Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities</p>	<p>Establishes standards for new hazardous waste land disposal facilities. The regulation applies to owners and operators of new hazardous waste landfills, surface impoundments, land treatment facilities and individually permitted Class I underground injection wells.</p>	<p>Alternatives 2, 3, 4, 5, and 10 have containment of remaining debris and consolidates and contain waste onsite that is sufficiently similar to landfilling and associated ground water monitoring. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities described above, as well as to the closure and post-closure of landfills.</p> <p>Alternative 9 utilizes land farming that may be sufficiently similar to treatment using land treatment units so that this regulation may be relevant and appropriate. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activity described above, as well as to the closure and post-closure of land treatment units.</p> <p>Alternative 8 injects the treated ground water into the aquifer which is sufficiently similar to Class I underground injection wells. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activity described.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>58 Federal Register 8658  40 CFR Part 264, Subpart S, Corrective Action Management Units (CAMUs)</p>	<p>Permits the agency to establish a Corrective Action Management Unit (CAMU) or units at CERCLA remedial sites.</p>	<p>EPA has designated the Petochem/Ekotak Site as a CAMU.</p> <p>Because the waste is sufficiently similar to RCRA hazardous waste, the requirement is relevant and appropriate to the activities.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
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Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq.</i>)</b>		
<p>40 CFR, Part 280, Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)</p> <p>UAC R311-202: UST Technical Standards</p> <p>UAC R311-207: Assessing the PST Fund for LUSTs</p> <p>UAC R311-211: Corrective Action Clean-up Standards for CERCLA and UST Sites.</p>	<p>Establishes technical standards and corrective action requirements for underground storage tanks. The regulation applies to all owners and operators of an underground storage tank system.</p>	<p>Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 remove two 1,000 gallon underground storage tanks in the former tank farm area. In addition, all the alternatives address the soils at the location of the previously removed UST #2. Because the waste at the site is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<b>Federal Water Pollution Control Act (amended by the Clean Water Act) Utah Water Quality Act (UCA Section 19-5-101, <i>et seq.</i>)</b>		
<p>40 CFR, Part 122, EPA Administered Permit Program: The National Pollutant Discharge Elimination System (NPDES)</p>	<p>Establishes requirements for stormwater discharge related to industrial activity. Stormwater runoff, snow melt runoff, and surface runoff and drainage associated with remedial actions which discharge to surface waters shall be conducted in compliance with RCRA, FWQC, CWA technology-based standards and best management practices.</p>	<p>Although none of the alternatives have a discharge component as part of the remedies, stormwater discharge may occur during the implementation of the remedies (e.g., runoff discharge from the open trenches or open excavation of the LNAPL during precipitation event). Therefore, the stormwater discharges limits must be met which include sampling, analysis, and treatment at the site is sufficiently similar to wastes regulated by NPDES permits, this regulation is relevant and appropriate to the activities described in this paragraph.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-301, et. seq.)</b>		
UAC R315-101: Clean-up Action and Risk-Based Closure Standards for RCRA Sites	Establishing clean-up standards for remedial decisions using risk analysis, and management for RCRA corrective action sites.	Because site is not being clean-closed, as defined by the rule, requires appropriate site management.
<b>Toxic Substances Control Act (15 USC 2625 and 2665)</b>		
40 CFR Part 761  Subpart G, PCB Spill Cleanup Policy	Sets forth PCB Spill policy and disposal requirements.	PCBs resulting from the clean-up and removal of spills, leaks, or other uncontrolled discharges, must be stored and disposed in accordance with this regulation. Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 address PCBs that spilled, leaked, or were discharged during the operation of the Petrochem/Ekotak facility. All of the above alternatives will be disposing PCBs as part of the cleanup alternatives thus the requirement to clean up to 10 ppm in the soils in relevant and appropriate for alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.
<b>Safe Drinking Water Act</b>		
40 CFR Part 144, Underground Injection Control Program  Part 145, State UIC Program Requirements  Part 146, Underground Injection Control Program: Criteria and Standards  Part 147, State Underground Injection Control Programs	Establishes standards for construction and operation of injection wells. Provides for protection of underground sources of drinking water.	Alternative 8 reinjects treated water into the aquifer beneath the Petrochem/Ekotak site. The requirements of this regulation is applicable to alternative 8. The requirements include constructing, operating, and maintaining a well in a manner that does not result in contamination of an underground source of drinking water at levels that violate MCLs or otherwise affect the health of persons. These requirements will be met by ensuring the effluent from the ground water treatment facility under alternative 8 meets standards that are protective of human health (based on MCLs and risk-based concentrations).  The State of Utah has an approved, delegated program for these requirements.

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
**Page 17 of 21**

<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Clean Air Act</b>		
40 CFR Part 60, Standards of Performance for New Stationary Sources	Establishes performance standard for new stationary sources of air pollutants	Alternatives 2, 3, 4, 5, 6, 7, 8, and 9 have varying levels of thermal desorption of soils onsite. Alternative 8 treats ground water via UV oxidation in an onsite treatment facility. Because these treatment components may create air pollutants, these alternatives are relevant and appropriate for the activities described in this paragraph.
40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants	Establishes emission standards for hazardous air pollutants from specific sources.	Alternatives 2, 3, 4, 5, 6, 7, 8, and 9 have varying levels of thermal desorption of soils onsite. Alternative 8 treats ground water via UV oxidation in an onsite treatment facility. Because these treatment components may create emissions from the treatment of benzene, beryllium, chloroform, inorganic arsenic, mercury, manganese, nickel, trichloroethylene, and vinyl chloride, these alternatives are relevant and appropriate for the activities described in this paragraph.
<b>Utah Air Conservation Act (UCA 19-2-101, et seq.)</b>		
UAC R307-1-1, and R307-1-3, Utah Air Conservation Rules  UAC, R307-1-3.1.8.B, Analysis for Degenerate Air Quality	These requirements constitute the legal bases for control of air pollution sources in the State of Utah. The National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare. Standards have been set for six pollutants: (1) particulate matter equal to or less than 10 microns particle size; (2) sulfur dioxide; (3) carbon monoxide; (4) ozone; (5) nitrogen dioxide; and (6) lead. National Standards of Performance for New Stationary Sources (NSPS), National Prevention of Significant Deterioration of Air Quality (PSD) standards, and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) also apply and are legally enforceable in Utah.	The State of Utah air pollutant regulations are relevant and appropriate to the control of fugitive dust and particulate emissions at the site. The Federal NAAQS standards are not enforceable in and of themselves, rather it is the emissions standards, which are promulgated to attain the NAAQS, that are directly enforceable and are ARARs. Those standards and requirements include, the fugitive dust standard; a requirement that all emissions are subject to BACT; and an analysis is required to assure that any emissions will not cause air quality to degenerate beyond any pertinent level. All proposed remedial technologies should be evaluated to determine whether any New Source Performance Standards may be considered ARARs.
UAC R307-1-3.1.8.A and R307-1-4.5.2: Fugitive Dust Standards	Regulations fugitive dust in general (e.g., from windblown soils), and associated with construction.	Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 involve construction activities that disturb the soils and create fugitive dust. This applicable requirements mandates BACT to control fugitive dust.

**Table 8.4**  
**Federal and State ARARs and TBCs for all Alternatives**  
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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Air Conservation Act (UCA 19-2-101, et seq.)</b>		
UAC R307-1-3.1.8.A	Requires BACT for all emissions.	Alternatives 2, 3, 4, 5, 6, 7, 8, 9 and 10 generate emissions either through construction fugitive dust or release of VOCs from excavation. This applicable requirement mandates BACT for all emissions, unless specifically exempted.
UAC R307-1-4: Standards for VOC emissions and dust.	Regulates VOC emissions.	Alternatives 2, 3, 4, 5, 6, 7, 8, 9 and 10 generate emissions either through construction fugitive dust or release of VOCs from excavation. This applicable requirement limits VOC emission from the Site, e.g., direct excavation of LNAPL.
<b>Utah Water Quality Act (UCA 19-5-101)</b>		
UAC 19-5-101	Establishes the rulemaking and enforcement authority for the regulation of water quality with the Utah Water Quality Board.	This act makes it unlawful for any person to discharge a pollutant into waters of the State or to cause pollution that constitutes a menace to the public health and welfare, or is harmful to wildlife, fish or aquatic life, or impairs domestic, agricultural, industrial, recreational, or other beneficial uses of water, or to places or cause to be placed any wastes in a location where there is probable cause to believe it will cause pollutant. This Act is applicable to alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the Petroche/Ekotak site in that pollutants were discharged into the soils and the ground water during operations of the facility.
UAC R317-7, Underground Injection Control Program	Establishes standards for construction and operation of injection wells. Provides for protection of underground sources of drinking water.	Alternative 8 reinjects treated water into the aquifer beneath the Petroch/Ekotak site. The requirements of this regulation is applicable to alternative 8. The requirements include constructing, operating, and maintaining a well in a manner that does not result in contamination of an underground source of drinking water at levels that violate MCLs or otherwise affect the health of persons. These requirements will be met by earning the effluent from the ground water treatment facility under alternative 8 meets standards that are protective of human health (based on MCLs and risk-based concentrations).



## Tables

**TABLE 2.3.1A**  
**OBSERVED SPECIES/EVALUATED SPECIES**  
**PETROCHEM/EKOTEK SITE**

<b>Observed Species</b>	<b>Evaluated in Ecological</b>
	<b>Risk Assessment</b> <b>(Yes/No) <sup>1</sup></b>
Pigeon	Yes
House Sparrows	No
House Finches	No
House Mice	No
European Starlings	No
Redtail Hawks	No
Killdeer	No
American Robin	No

<sup>1</sup> Species not evaluated in Ecological Risk Assessment were not observed feeding or drinking on site. Also, lack of small mammals and habitat to support small mammal population eliminated evaluation of observed raptors or other predators.

**TABLE 2.3.1B**  
**VEGETATION SPECIES OBSERVED**  
**PETROCHEM/EKOTEK SITE**

Common Name	Scientific
<b>Tree and Shrub Species</b>	
boxelder	<i>Acer negundo</i>
Chinese sumac	<i>Ailanthus altissima</i>
elm	<i>Ulmus</i> sp.
juniper	<i>Uniperus</i> sp.
pear	<i>Pyrus communis</i>
plum	<i>Prunus</i> sp.
sycamore	<i>Plantus</i> sp.
<b>Herbaceous Species</b>	
bull thistle	<i>Cirsium vulgare</i>
cheatgrass	<i>Bromus tectorum</i>
common sunflower	<i>Helianthus annuus</i>
curlycup gumweed	<i>Grindelia squarrosa</i>
dalmation toadflax	<i>Linaria dalmatica</i>
dock	<i>Rumex</i> sp.
field bindweed	<i>Convolvulus arvensis</i>
foxtail barley	<i>Hordeum jubatum</i>
kochia	<i>Kochia scoparia</i>
orchard-grass	<i>Dactylis glomerata</i>
prickly lettuce	<i>Lactuca serriola</i>
rabbitbrush	<i>Chrysothamnus nauseosus</i>
ragweed	<i>Ambrosia</i> sp.
rose	<i>Rosa</i> sp.
Russian thistle	<i>Salsola pestifer</i>
sweetclover	<i>Melilotus</i> sp.
vetch	<i>Vicia</i> sp.

**TABLE 4.3**

**FACT SHEETS FOR**

**PETROCHEM/EKOTEK SITE**

<b>Published Date</b>	<b>Fact Sheet Title</b>	<b>Description</b>
January 1990	Removal Action	Brief description of debris removal onsite.
April 1990	Information Bulletin	Update of events on site from December of 1989
March 1991	Information Bulletin	Overall update, included notice of 104Es
September 1992	Superfund Program	Brief description of superfund program and its applicability to Petrochem/Ekotek Site
July 1993	Community Health	Update on effects of community health from onsite pollution.
October 1993	Deminimis Settlement	Facts on deminimis settlement with PRPs
July 1995	Proposed Plan	Overview of the alternatives evaluated for the proposed cleanup remedy.

**TABLE 6.1.1.1A**  
**SUMMARY STATISTICS TABLE FOR ONSITE SURFACE SOILS**  
**PETROCHEM/EKOTEK SITE<sup>1</sup>**

ANALYTE	FREQUENCY OF DETECTION <sup>2</sup>	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION	UPPER 95% ONE-SIDED CONF. LIM.	EXPOSURE POINT CONC.
<b>EXT HYDROCARBONS (ppm)</b>	52 / 60	6.9 - 160000	13586	30769	20226	20226
<b>TOTAL METALS (ppm)</b>						
Antimony	19 / 60	2.03 - 19	4.66	3.96	5.52	5.52
Arsenic	46 / 60	4.8 - 237	21	34	28.3	28
Beryllium	55 / 60	0.09 - 1.31	0.43	0.33	0.51	0.51
Cadmium	45 / 60	0.515 - 19	4.29	4.39	5.2	5.23
Chromium	59 / 60	2.2 - 76	19	16	22.8	23
Copper	60 / 60	9.5 - 1080	104	155	137	137
Lead	60 / 60	7.1 - 2330	270	348	346	346
Mercury	28 / 60	0.1 - 0.6	0.15	0.14	0.18	0.18
Nickel	55 / 60	4 - 105	18	17	21.6	22
Selenium	1 / 60	8.3 - 8.3	2.8	1.1	3.0	3.0
Silver	8 / 60	1 - 15	1.2	2.0	1.7	1.7
Thallium	19 / 60	8 - 88	8	13	11.2	11.2
Zinc	59 / 60	20 - 2170	281	342	354	354
Vanadium	30 / 30	10.4 - 42.8	23	8	25.0	25.0
Manganese	30 / 30	130 - 495	264	111	298	298
<b>PCBs (ppm)</b>						
Aroclor - 1254	4 / 60	3.75 - 16.9	1.0	2.6	1.5	1.5
Aroclor - 1260	18 / 60	0.735 - 92.2	3.1	12	5.7	5.7
<b>PESTICIDES (ppm)</b>						
Aldrin	1 / 11	0.1 - 0.1	0.027	0.026	0.041	0.041
beta - BHC	1 / 11	0.11 - 0.11	0.033	0.031	0.049	0.049
delta - BHC	1 / 11	0.008 - 0.008	0.024	0.018	0.034	0.008
4,4' - DDD	1 / 11	0.014 - 0.0114	0.036	0.022	0.048	0.014
Dieldrin	2 / 11	0.0028 - 0.08	0.043	0.025	0.057	0.057
Endosulfan I	1 / 11	0.042 - 0.042	0.022	0.012	0.028	0.028
Endosulfan II	1 / 11	0.067 - 0.076	0.043	0.023	0.055	0.055
Endosulfan sulfate	1 / 11	0.13 - 0.13	0.048	0.034	0.067	0.067
Endrin ketone	1 / 11	0.14 - 0.14	0.048	0.036	0.068	0.068
<b>VOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Acetone	25 / 30	0.01 - 0.41	0.094	0.091	0.122	0.122
Benzene	1 / 30	0.01 - 0.01	0.009	0.005	0.010	0.010
2-Butanone	1 / 30	0.063 - 0.063	0.174	0.110	0.208	0.208
Chloromethane	1 / 30	0.002 - 0.002	0.018	0.011	0.021	0.021
1,1-Dichlorethane	1 / 30	0.019 - 0.019	0.009	0.006	0.011	0.011
Cis-1,2-Dichloroethene	1 / 30	0.02 - 0.02	0.009	0.006	0.010	0.010
Ethyl Benzene	5 / 30	0.004 - 0.015	0.008	0.005	0.009	0.009
Methylene Chloride	14 / 30	0.002 - 0.15	0.022	0.034	0.033	0.033
Tetrachloroethene	3 / 30	0.009 - 0.13	0.013	0.023	0.020	0.020
Toluene	16 / 30	0.001 - 0.033	0.007	0.007	0.009	0.009
1,1,1-Trichloroethane	2 / 30	0.007 - 0.03	0.009	0.006	0.011	0.011
Trichloroethene	2 / 30	0.031 - 0.11	0.013	0.019	0.019	0.019
Total Xylenes	12 / 30	0.001 - 0.075	0.011	0.014	0.016	0.016

**TABLE 6.1.1.1A**  
**SUMMARY STATISTICS TABLE FOR ONSITE SURFACE SOILS**  
**PETROCHEM/EKOTEK SITE<sup>1</sup>**

ANALYTE	FREQUENCY OF DETECTION <sup>2</sup>	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION	UPPER 95% ONE-SIDED CONF. LIM.	EXPOSURE POINT CONC.
<b>SEMIVOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Acenaphthene	3 / 47	0.23 - 8.05	9.1	16.1	13.1	8.05
Anthracene	4 / 47	0.42 - 36.2	9.7	16.6	13.8	13.8
Benzo(a)Pyrene	6 / 47	0.16 - 54.7	10.3	17.4	14.5	14.5
Benzo(b)Fluoranthene	10 / 47	0.23 - 59.4	10.1	17.7	14.5	14.5
Benzo(g,h,i)perylene	9 / 47	0.55 - 27.2	10.0	16.4	14.0	14.0
Benzo(k)Fluoranthene	5 / 47	0.74 - 34.9	9.8	16.5	13.8	13.8
Benzo(a)Anthracene	8 / 47	0.26 - 100	10.8	20.9	15.9	15.9
Butylbenzylphthalate	6 / 47	0.27 - 15	8.4	13.5	11.8	11.8
Di-n-Butylphthalate	2 / 47	0.43 - 41.8	10.6	16.4	14.6	14.6
Chrysene	16 / 47	0.38 - 88	9.2	18.5	13.7	13.7
Dibenz(a,h)Anthracene	8 / 47	0.83 - 16	9.2	16.1	13.2	13.2
Dibenzofuran	1 / 47	3.72 - 3.72	9.0	16.1	13.0	3.72
2,6-Dinitrotoluene	1 / 47	34 - 34	9.5	16.6	13.5	13.5
bis(2-Ethylhexyl)Phthalate	4 / 47	0.22 - 2	10.0	15.9	13.9	2.0
Fluoranthene	7 / 47	0.38 - 171	12.8	28.5	19.8	19.8
Fluorene	4 / 47	0.13 - 7.41	9.1	16.1	13.0	7.41
Indeno(1,2,3-cd)Pyrene	9 / 47	0.13 - 26	9.4	16.3	13.4	13.4
2-Methylnaphthalene	2 / 47	0.14 - 0.51	8.9	16.2	12.9	0.51
Naphthalene	2 / 47	0.37 - 0.83	9.0	16.2	12.9	0.83
Di-n-Octyl Phthalate	11 / 47	0.11 - 2.1	9.0	16.0	12.9	2.1
Phenanthrene	8 / 47	0.47 - 118	11.3	22.6	16.8	16.8
Phenol	1 / 47	18.6 - 18.6	9.4	16.2	13.3	13.3
Pyrene	9 / 47	0.56 - 170	12.9	28.4	19.8	19.8
1,2,4-Trichlorobenzene	1 / 47	11.4 - 11.4	9.2	16.1	13.1	11.4
<b>DIOXINS/FURANS (ppm)</b>						
TCDD (TEF) Cancer	7 / 7	1.08E-05 - 1.08E-04	5.31E-05	3.56E-05	7.92E-05	7.92E-05
TCDD (TEF) Noncancer	7 / 7	1.43E-05 - 1.40E-04	6.47E-05	4.42E-05	9.72E-05	9.72E-05
HxCDD (Total) Cancer	7 / 7	3.31E-05 - 3.23E-04	1.17E-04	1.01E-04	1.91E-04	1.91E-04

<sup>1</sup> Table derived from data in August 1994 Baseline Human Health Risk Assessment.

<sup>2</sup> Table includes onsite surface samples OS1-OS4. Offsite samples OS5-OS14 are not included.

**Table 6.1.1.1B**  
**SUMMARY STATISTICS TABLE FOR REFERENCE SURFACE SOILS**  
**PETROCHEM/EKOTEK SITE<sup>1</sup>**

	FREQUENCY OF DETECTION <sup>2</sup>	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION	UPPER 95% ONE-SIDED CONF. LIM.	EXPOSURE POINT CONC.
<b>EXT HYDROCARBONS (ppm)</b>	1 / 10	22.5 - 22.5	4.5	6.32	8.17	8.17
<b>TOTAL METALS (ppm)</b>						
Antimony	2 / 10	6.75 - 12.1	3.485	3.38	5.44	5.44
Arsenic	10 / 10	11.4 - 36.1	18.03	8.10	22.7	22.7
Beryllium	10 / 10	0.022 - 0.1	0.0358	0.023	0.049	0.049
Cadmium	10 / 10	4.59 - 12.5	7.077	2.71	8.65	8.65
Chromium	10 / 10	16.4 - 49.9	25.57	11.0	32.0	32.0
Copper	10 / 10	39.6 - 231	103.72	69.1	144	144
Lead	10 / 10	43.4 - 1150	303.04	321	489	489
Mercury	7 / 10	0.105 - 0.291	0.1415	0.084	0.19	0.19
Nickel	10 / 10	6.43 - 16	11.479	2.71	13.0	13.0
Zinc	10 / 10	149 - 2430	611.9	694	1014	1014
Vanadium	10 / 10	16.8 - 33.1	21.77	5.23	24.8	24.8
Manganese	10 / 10	215 - 1050	387.5	238	526	526
<b>DIOXINS/FURANS (ppm)</b>						
TCDD (TEF)	2 / 3	5.71E-07 - 1.33E-06	1.02E-06	4.00E-07	1.69E-06	133E-06
<b>SEMIVOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Benzo(a)Pyrene	1 / 10	1.2 - 1.2	0.345	0.300	0.519	0.519
Benzo(b)Fluoranthene	1 / 10	1.4 - 1.4	0.365	0.364	0.576	0.576
Benzo(g,h,i)perylene	1 / 10	0.9 - 0.9	0.315	0.206	0.434	0.434
Benzo(k)Fluoranthene	1 / 10	0.9 - 0.9	0.315	0.206	0.434	0.434
Benzo(a)Anthracene	1 / 10	1.4 - 1.4	0.59	0.285	0.755	0.755
Chrysene	1 / 10	1.5 - 1.5	0.375	0.395	0.604	0.604
Fluoranthene	1 / 10	2.8 - 2.8	0.505	0.806	0.972	0.972
Indeno(1,2,3-cd)Pyrene	1 / 10	0.9 - 0.9	0.315	0.206	0.434	0.434
Phenanthracene	1 / 10	2.4 - 2.4	0.465	0.680	0.859	0.859
Pyrene	1 / 10	2.7 - 2.7	0.495	0.775	0.944	0.944

<sup>1</sup> Table derived from data in August 1994 Baseline Human Health Risk Assessment.

<sup>2</sup> Found in offsite reference surface soil samples OS5-OS14

**TABLE 5.1.1.1C**  
**SUMMARY STATISTICS TABLE FOR ONSITE SUBSURFACE SOILS**  
**PETROCHEM/KEKOTEK SITE**

	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION	UPPER 95% ONE-SIDED CONF. LIMIT	EXPOSURE POINT CONC.
<b>EXT. HYDROCARBONS (ppm)</b>	40 / 114	70 - 203000	7588	23219	11608	11608
<b>TOTAL ORGANIC CARBON (%)</b>	33 / 43	0.06 - 11.78	1.32	2.57	1.96	1.96
<b>TOTAL METALS (ppm)</b>						
Antimony	22 / 113	1.17 - 41.9	4.02	4.60	4.73	4.73
Arsenic	95 / 113	1.51 - 372	14.2	35.6	19.7	19.7
Beryllium	113 / 113	0.06 - 1.11	0.39	0.24	0.43	0.43
Cadmium	59 / 113	0.315 - 50.3	3.46	5.40	4.30	4.30
Chromium	113 / 113	1.75 - 60.3	13.7	9.29	15.2	15.2
Copper	112 / 113	3.3 - 344	23.9	50.0	33.7	33.7
Lead	77 / 113	2.85 - 3880	116	427	183	183
Mercury	27 / 113	0.103 - 2.8	0.13	0.28	0.18	0.18
Nickel	104 / 113	1 - 980	20.7	91.4	35.0	35.0
Selenium	37 / 113	4.52 - 15	2.68	1.55	2.92	2.92
Silver	11 / 113	1.1 - 11.2	1.00	1.07	1.16	1.16
Thallium	25 / 113	1.24 - 36	6.46	8.64	7.81	7.81
Zinc	108 / 113	9.97 - 2030	116	298	163	163
Vanadium	65 / 66	4.03 - 35.9	20.0	8.77	21.8	21.8
Manganese	56 / 66	13 - 8823	349	1062	568	568
<b>PCBs (ppm)</b>						
Aroclor - 1232	1 / 113	6.36 - 6.36	0.24	0.59	0.33	0.33
Aroclor - 1240	11 / 113	0.11 - 3.41	0.34	0.53	0.42	0.42
<b>PESTICIDES (ppm)</b>						
Aldrin	2 / 16	0.00093 - 0.00098	0.0097	0.0106	0.0143	0.00098
delt - BHC	1 / 16	0.0011 - 0.0011	0.0104	0.0102	0.0149	0.0011
Dieldrin	3 / 16	0.0034 - 0.02	0.0159	0.0168	0.0232	0.001
Endosulfan I	2 / 16	0.00093 - 0.0012	0.0097	0.0106	0.0143	0.0012
gamma - BHC	2 / 16	0.0012 - 0.0012	0.0097	0.0106	0.0143	0.0012
Heptachlor epoxide	1 / 16	0.0014 - 0.0014	0.0099	0.0104	0.0145	0.0014
<b>DIOXIN/FURAN (ppm)</b>						
TCDD (TEF)	2 / 4	2.30E-06 - 5.57E-05	1.64E-05	2.62E-05	4.72E-05	4.72E-05
<b>VOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Acetone	25 / 79	0.011 - 10	0.682	1.71	1.00	1.00
Benzene	13 / 79	0.001 - 0.83	0.0483	0.137	0.074	0.074
3-Butanone (MEK)	5 / 79	0.014 - 0.57	0.354	0.901	0.52	0.52
Carbon Disulfide	3 / 79	0.001 - 0.038	0.217	0.382	0.33	0.038
Carbon Tetrachloride	1 / 79	0.034 - 0.034	0.0159	0.042	0.024	0.024
Chlorobenzene	9 / 79	0.006 - 1.59	0.0677	0.226	0.11	0.11
Chloroethane	5 / 79	0.12 - 0.12	0.0365	0.091	0.054	0.054
Chloroform	1 / 79	0.019 - 0.019	0.0283	0.067	0.041	0.019
Chloromethane	1 / 79	0.033 - 0.033	0.0984	0.239	0.14	0.033
1,1-Dichloroethane	7 / 79	0.004 - 0.72	0.0600	0.141	0.087	0.087
1,2-Dichloroethane	1 / 79	0.36 - 0.36	0.0326	0.076	0.047	0.047
1,1-Dichloroethene	1 / 79	0.1 - 0.1	0.0503	0.120	0.073	0.073
Cis-1, 2-Dichloroethene	4 / 79	0.019 - 0.061	0.0168	0.042	0.023	0.023
1,2-Dichloropropane	1 / 79	0.04 - 0.04	0.0286	0.067	0.041	0.04
Ethyl Benzene	21 / 79	0.001 - 3.46	0.271	0.893	0.44	0.44
Methylene Chloride	24 / 79	0.002 - 0.93	0.0471	0.121	0.070	0.070
Styrene	1 / 79	0.035 - 0.035	0.033	0.069	0.046	0.035
Tetrachloroethene	11 / 79	0.007 - 2.85	0.075	0.327	0.14	0.14
Toluene	34 / 79	0.001 - 36.6	0.67	4.15	1.44	1.44
1,1,1-Trichloroethane	5 / 79	0.001 - 0.031	0.0283	0.067	0.041	0.031
Trichloroethene	7 / 79	0.003 - 0.699	0.0252	0.088	0.042	0.042
Total Xylenes	37 / 79	0.001 - 64	1.77	7.91	3.25	3.25



**TABLE 6.1.1.1C**  
**SUMMARY STATISTICS TABLE FOR ONSITE SUBSURFACE SOILS**  
**PETROCHEM/KEOTEK SITE<sup>1</sup>**

	FREQUENCY OF DETECTION <sup>2</sup>	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION	UPPER 95% ONE-SIDED CONF. LIM.	EXPOSURE POST- CONC.
<b>SEMIVOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Acenaphthylene	2 / 85	1.9 - 39.3	2.43	9.98	4.23	4.23
Acenaphthene	1 / 85	78.5 - 78.5	1.99	12.4	5.22	5.22
Anthracene	2 / 85	1.28 - 54.1	2.71	10.8	4.66	4.66
Benzo (a) Pyrene	3 / 85	0.023 - 0.13	2.08	9.16	3.74	0.13
Benzo (b) Fluoranthene	7 / 85	0.019 - 0.081	2.07	9.16	3.73	0.08
Benzo (g,h,i) perylene	9 / 85	0.02 - 0.27	2.07	9.16	3.72	0.27
Benzo (k) Fluoranthene	2 / 85	0.027 - 0.027	2.08	9.16	3.74	0.03
Benzo(a)Anthracene	5 / 85	0.022 - 6.1	2.23	9.15	3.88	3.88
Butylbenzylphthalate	2 / 85	1.2 - 1.5	3.73	9.92	5.52	1.50
Di-n-Butylphthalate	3 / 85	6.02 - 9.39	3.98	9.93	5.77	5.77
bis(2-Chloroethyl) Ether	3 / 85	0.77 - 16.1	2.43	9.37	4.12	4.12
Chrysene	11 / 85	0.022 - 9.7	2.02	9.13	3.67	3.67
Dibenz (a,b) Anthracene	8 / 85	0.028 - 0.27	2.06	9.16	3.72	0.27
Dibenzofuran	1 / 85	0.53 - 0.53	2.10	9.16	3.73	0.53
2,4-Dimethylphenol	2 / 85	5.6 - 6.7	2.18	9.18	3.84	3.84
bis(2-Ethylhexyl) Phthalate	14 / 85	0.021 - 1.9	3.71	9.94	5.50	1.90
Fluorene	5 / 85	0.021 - 25.4	2.39	9.51	4.11	4.11
Fluorene	5 / 85	0.18 - 102	3.31	14.2	5.87	5.87
Indeno (1,2,3-cd) Pyrene	6 / 85	0.03 - 0.23	2.07	9.16	3.72	0.23
2-Methylnaphthalene	16 / 85	0.52 - 226	7.25	27.7	12.3	12.3
2-Methylphenol	2 / 85	0.55 - 5.3	2.13	9.17	3.79	3.79
4-Methylphenol	5 / 85	1.14 - 16.3	2.39	9.30	4.07	4.07
Naphthalene	14 / 85	0.21 - 84.5	3.80	12.6	6.07	6.07
Di-n-octyl Phthalate	8 / 85	0.018 - 8.8	3.18	7.80	4.59	4.59
Phenanthrene	15 / 85	0.065 - 239	5.37	27.3	10.3	10.3
Phenol	2 / 85	3.55 - 14	2.27	9.25	3.94	3.94
Pyrene	13 / 85	0.023 - 24	2.49	9.72	4.25	4.25
1,2,4-Trichlorobenzene	1 / 85	31.5 - 31.5	2.44	9.70	4.19	4.19

<sup>1</sup> Table derived from data in August 1994 Baseline Human Health Risk Assessment.

<sup>2</sup> Found in all onsite subsurface soil samples

**TABLE 6.1.1.3**  
**SOIL/BURIED DEBRIS**  
**EXCEEDANCE AREAS AND VOLUMES<sup>1</sup>**

Location	0-1 Foot		1-5 Feet		5-20 Feet		Total Impacted Area (SY)	Total Volume (CY)
	Area (SY)	Volume (CY)	Area (SY)	Volume (CY)	Area (SY)	Volume (CY)		
PRG Exceedance Areas <sup>2</sup> (Offsite and Onsite)	18,700	7,000 <sup>a</sup>	5,000	6,000 <sup>a</sup>	1,000	7,000	19,000 <sup>a</sup>	20,000 <sup>a</sup>
Debris Area	2,000	600	2,000	3,000	2,000	10,000	2,000	14,000 <sup>a</sup>
Former UST #2 Area	400	100	100	200	500	2,000	700	2,300
Hot Spot Criteria Exceedance Areas <sup>2</sup>	700	200	--	--	--	--	700	200
Total Hydrocarbon Hot Spot Area <sup>4</sup>	400	130					400	130

<sup>a</sup> Approximate estimate.

<sup>1</sup> Source: FS, January 1995.

<sup>2</sup> Derived from Risk-Based concentrations exceeding a carcinogenic risk of 10E-06.

<sup>3</sup> Derived from Risk-Based concentrations exceeding a carcinogenic risk of 10E-04.

<sup>4</sup> Total Hydrocarbon Hot Spot includes soil/debris with TPH concentrations exceeding 100,000 ppm.

**TABLE 6.1.2.3**  
**CALCULATED PARTITIONING OF CHEMICALS FROM FREE PHASE HYDROCARBON TO WATER<sup>1</sup>**

Compound	Maximum Concentration in Hydrocarbon (Coil; mg/kg)	Maximum Calculated Concentration in Soil (1) (Csoil; mg/kg)	Organic Carbon Partition Coefficient (2) (Koc; unitless)	Octanol/Water Partition Coefficient (2) (Kow; unitless)	Fraction Organic Carbon (3) (foc; unitless)	Fraction Residual Saturation (4) (foil; unitless)	Calculated Maximum Concentration in Water (5) (Cw; mg/l)	Measured Maximum Concentration in Groundwater (mg/l)
Arochlor-1242	48	10	1.3E+03	1.3E+04	0.0308	0.20	3.5E-03	<2.0E-03
Arochlor-1260	116	23	2.6E+06	8.1E+06	0.0308	0.20	1.4E-05	<2.0E-03
Benzene	2	0	1.0E+02	1.6E+02	0.0308	0.20	1.2E-02	5.2E-03
Toluene	14	3	1.8E+02	6.3E+02	0.0308	0.20	2.1E-02	6.5E-03
1,2-Dichlorobenzene	198	40	1.7E+03	2.7E+03	0.0308	0.20	6.7E-02	<5.0E-03
1,4-Dichlorobenzene	29	6	1.6E+02	4.2E+03	0.0308	0.20	6.9E-03	<5.0E-03
Ethylbenzene	21	4	2.6E+02	1.4E+03	0.0308	0.20	1.5E-02	4.7E-03
n-Propylbenzene	37	7	7.4E+03	5.2E+03	0.0308	0.20	6.9E-03	<1.0E-02
p-Isopropyltoluene	118	24			0.0308	0.20		<1.0E-02
n-Butylbenzene	90	18	2.5E+03	4.4E+04	0.0308	0.20	2.0E-03	<1.0E-02
sec-Butylbenzene	73	15	8.9E+02	1.7E+04	0.0308	0.20	4.2E-03	<1.0E-02
Xylenes	166	33	1.6E+03	1.6E+03	0.0308	0.20	9.1E-02	1.8E-02
1,2,4-Trimethylbenzene	366	73	3.7E+03	6.0E+03	0.0308	0.20	5.5E-02	<1.0E-02
1,2,5-Trimethylbenzene	55	11	1.6E+03	2.6E+03	0.0308	0.20	1.9E-02	<1.0E-02
Vinyl Chloride	0.48	0.096	2.5E+00	4.0E+00	0.0308	0.20	1.1E-01	1.6E-01
1,1,1-Trichloroethane	0.13	0.026	1.3E+02	2.2E+02	0.0308	0.20	5.5E-04	1.6E-01
Tetrachloroethylene	0.41	0.082	3.0E+02	3.1E+02	0.0308	0.20	1.2E-03	<5.0E-04
Naphthalene	181	36	3.3E+03	5.0E+04	0.0308	0.20	3.6E-03	<5.0E-03
Acenaphthene	50	10	1.8E+01	2.1E+04	0.0308	0.20	2.3E-03	<5.0E-03
Fluorene	85	17	5.0E+03	2.4E+04	0.0308	0.20	3.4E-03	<5.0E-03
Phenanthrene	175	35	3.9E+04	3.7E+04	0.0308	0.20	4.1E-03	<5.0E-03
Anthracene	30	6	8.5E+04	3.5E+04	0.0308	0.20	6.3E-04	<5.0E-03
Pyrene	87	17	1.7E+05	3.3E+05	0.0308	0.20	2.4E-04	<5.0E-03
Chrysene	24	5	2.5E+05	8.1E+05	0.0308	0.20	2.8E-05	<5.0E-03

- (1) Csoil=foil\*Coil  
(2) Montgomery (1991)  
(3) Median of measured concentrations  
(4) Estimated based on Dragun (1988)  
(5) Cw=foil\*Coil/(foc\*Koc+foil\*Kow)

<sup>1</sup> Source: March 1995 Sampling Data Packages from RUST

**TABLE 6.1.3.2A**  
**SUMMARY STATISTICS TABLE FOR ONSITE GROUNDWATER FOR**  
**1ST, 2ND, AND 3RD QUARTERS SAMPLING**

ANALYTE	FREQUENCY OF DETECTION <sup>2</sup>	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION	UPPER 95% ONE-SIDED CONF. LIM.	EXPOSURE POINT CONC.
<b>EXT. HYDROCARBONS (ppm)</b>	5 / 40	0.5 - 16	0.719	2.53	1.394	1.394
<b>TOTAL METALS (ppm)</b>						
Antimony	2 / 40	0.0042 - 0.026	0.0025	0.0039	0.0035	0.0035
Arsenic	31 / 40	0.00313 - 0.15	0.0157	0.0258	0.0226	0.0226
Beryllium	1 / 40	0.0056 - 0.0056	0.0004	0.0008	0.00061	0.0006
Cadmium	1 / 40	0.005 - 0.005	0.0037	0.0013	0.0040	0.0040
Chromium	4 / 40	0.01 - 0.35	0.0172	0.0549	0.0318	0.0318
Copper	1 / 40	0.029 - 0.029	0.0116	0.0221	0.0175	0.0175
Manganese	14 / 18	0.03 - 0.41	0.0978	0.1143	0.1447	0.1447
Mercury	6 / 40	0.00035 - 0.0204	0.0007	0.0032	0.0016	0.0016
Nickel	4 / 40	0.01 - 0.05	0.0179	0.0180	0.0227	0.0227
Selenium	1 / 40	0.17 - 0.17	0.0319	0.0237	0.0382	0.0382
Silver	3 / 40	0.078 - 0.27	0.0187	0.0452	0.0307	0.0307
Thallium	3 / 40	0.1 - 0.2	0.0395	0.0361	0.0491	0.0491
Zinc	5 / 40	0.013 - 0.61	0.0342	0.1130	0.0642	0.0642
<b>VOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Acetone	1 / 40	0.021 - 0.021	0.01440	0.01003	0.0171	0.0171
Benzene	9 / 40	0.00052 - 0.00052	0.00065	0.00085	0.00088	0.0009
Carbon Disulfide	12 / 40	0.0021 - 0.017	0.00751	0.00555	0.0090	0.0090
Chloroform	1 / 40	0.0069 - 0.0069	0.00100	0.00103	0.00127	0.0013
1,1-Dichlorethane	15 / 40	0.0017 - 0.11	0.00866	0.01929	0.01380	0.0138
Cis 1,2-Dichloroehtene	5 / 32	0.005 - 0.103	0.00583	0.01794	0.01121	0.0112
Ethyl Benzene	1 / 40	0.0047 - 0.0047	0.00081	0.00080	0.00103	0.0010
Styrene	1 / 40	0.0019 - 0.0019	0.00087	0.00041	0.00098	0.0010
Toluene	2 / 40	0.00065 - 0.0065	0.00143	0.00138	0.00180	0.0018
1,1,1-Trichloroethane	2 / 40	0.0016 - 0.00252	0.00077	0.00058	0.00092	0.0009
Vinyl Chloride	8 / 40	0.0016 - 0.16	0.00647	0.02514	0.0132	0.0132
Total Xylenes	3 / 40	0.001 - 0.018	0.00131	0.00294	0.0021	0.0021
<b>SEMIVOLATILE ORGANIC COMPOUNDS (ppm)</b>						
Acenaphthene	1 / 40	0.0013 - 0.0013	0.00129	0.00112	0.00159	0.0013
Benzo(b)Fluoranthene	2 / 40	0.0008 - 0.00089	0.00129	0.00111	0.00159	0.0009
Butylbenzylphthalate	2 / 40	0.0005 - 0.00061	0.01140	0.01246	0.0147	0.0006
bis(2-Chloroethyl)Ether	1 / 40	0.0049 - 0.0049	0.00151	0.00114	0.0018	0.0018
Chrysene	1 / 40	0.00067 - 0.00067	0.00127	0.00113	0.00157	0.0007
1,2-Dichlorobenzene	5 / 40	0.00068 - 0.0051	0.00155	0.00136	0.00191	0.0019
1,3-Dichlorobenzene	1 / 40	0.00061 - 0.00061	0.00127	0.00113	0.00157	0.0006
1,4-Dichlorobenzene	2 / 40	0.00093 - 0.00094	0.00130	0.00111	0.00159	0.0009
bis(2-Ethylhexyl)Phthalate	1 / 40	0.0014 - 0.0014	0.01167	0.01221	0.01493	0.0014
Fluorene	1 / 40	0.0016 - 0.0016	0.00130	0.00112	0.00160	0.0016
2-Methylnaphthalene	1 / 40	0.0034 - 0.0034	0.00134	0.00117	0.00165	0.0017
Naphthalene	2 / 40	0.0067 - 0.01	0.00161	0.00195	0.00213	0.0021
Di-n-octyl Phthalate	1 / 40	0.00068 - 0.00068	0.00128	0.00112	0.00158	0.0007
Phenanthrene	1 / 40	0.00063 - 0.00063	0.00127	0.00113	0.00157	0.0006

<sup>1</sup> Table derived from data in August 1994 Baseline Human Health Risk Assessment.

<sup>2</sup> Found in all onsite sampling wells excluding W-7, W-9, W-10, MW1, MW2 and MW3

TABLE 6.1.3.2B  
SUMMARY STATISTICS TABLE FOR GROUNDWATER COCS  
DURING 4TH, 5TH, AND 6TH QUARTER SAMPLING  
PETROCHEM/EKOTEK SITE

	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION
<b>TOTAL METALS (ppm)</b>				
Antimony	0 / 29	ND	--	--
Arsenic	24 / 29	0.0027 - 0.051	0.013	0.011
Beryllium	1 / 29	0.00066 - 0.00066	0.00066	--
Manganese	21 / 29	0.012 - 1.02	0.22	0.297
Mercury	2 / 29	0.00027 - 0.0525	0.0264	0.037
Nickel	6 / 29	0.011 - 0.05	0.038	0.016
Silver	0 / 29	ND	--	--
Thallium	7 / 29	0.007 - 0.008	0.0073	0.00049
<b>VOLATILE ORGANIC COMPOUNDS (ppm)</b>				
Benzene	0 / 31	ND	--	--
Chloroform	2 / 31	0.005 - 0.0133	0.0092	0.0059
Cis 1,2-Dichloroethene	2 / 31	0.0095 - 0.0103	0.0099	0.00057
Vinyl Chloride	1 / 31	0.0028 - 0.0028	0.0028	--
<b>SEMIVOLATILE ORGANIC COMPOUNDS (ppm)</b>				
Benzo (b) Flouranthene	0 / 16	ND	--	--

TABLE 6.1.3.2C  
SUMMARY STATISTICS TABLE FOR GROUNDWATER COCS  
FROM OCTOBER 1994 THROUGH AUGUST 1995<sup>1</sup>  
PETROCHEM/EKOTEK SITE

	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	MEAN	STANDARD DEVIATION
<b>TOTAL METALS (ppm)</b>				
Arsenic	106/165	0.0011 - 0.098	0.02	0.02
<b>VOLATILE ORGANIC COMPOUNDS (ppm)<sup>2</sup></b>				
Benzene	18/165	0.00059 - 0.00213	0.00123	
Chloroform	18/165	0.00005 - 0.00931	0.00212	0.00216
Cis 1,2-Dichloroethene	34/165	0.00445 - 0.0120	0.00704	0.00341
Vinyl Chloride	45/165	0.00055 - 0.00103	0.00341	0.00454

<sup>1</sup> Data collected in Oct 94, Nov 94, Dec 94, Jan 95, Feb 95, March 95, May95, and August95.

<sup>2</sup> Constituents are those that account for significant portion of risk or are biodegradation constituents.

**TABLE 7.1.4A**  
**NONCARCINOGENIC RISKS FOR EACH COC AND SCENARIO**  
**PETROCHEM/EKOTEK SITE**

CHEMICAL OF CONCERN	SOIL				GROUNDWATER			
	INDUSTRIAL		RESIDENTIAL		INDUSTRIAL		RESIDENTIAL	
	RME	CTE	RME	CTE	RME	CTE	RME	CTE
aldrin			5.01E-03	1.79E-03				
antimony			5.04E-02	1.80E-02	8.60E-02	5.27E-02	3.05E-01	1.29E-010
arsenic					7.37E-01	4.52E-01	2.61E+00	1.11E+00
beryllium			3.69E-04	1.32E-04	1.19E-03	7.31E-04	4.23E-03	1.79E-03
chloroform					1.25E-03	7.64E-04	4.42E-03	1.87E-03
dichloroethene, cis-1,2					1.10E-02	6.72E-03	3.89E-02	1.65E-02
dieldrin			4.15E-03	1.48E-03				
manganese					2.83E-01	1.74E-01	1.00E+00	4.26E-01
mercury					5.15E-02	3.16E-02	1.83E-01	7.74E-02
nickel					1.11E-02	6.81E-03	3.94E-02	1.67E-02
silver					6.01E-02	3.69E-02	2.13E-01	9.05E-02
thallium (as chloride)	6.86E-02	6.01E-02	5.13E-01	1.83E-01	6.01E+00	3.86E+01	2.13E+01	9.04E+00
TOTALS	6.86E-02	6.01E-02	5.73E-01	2.04E-01	7.25E+00	4.44E+00	2.57E+01	1.09E+01

**TABLE 7.1.4B**  
**CARCINOGENIC RISKS FOR EACH COC AND SCENARIO**  
**PETROCHEM/EKOTEK SITE**

CHEMICAL OF CONCERN	SOIL				GROUNDWATER			
	INDUSTRIAL		RESIDENTIAL		INDUSTRIAL		RESIDENTIAL	
	RME	CTE	RME	CTE	RME	CTE	RME	CTE
aldrin			8.07E-03	5.87E-08				
arsenic					1.38E-04	1.69E-05	3.40E-04	4.48E-05
benz (a)anthracene	2.03E-06	3.56E-07	6.92E-06	7.30E-07				
benzene					8.91E-08	1.09E-08	2.20E-07	2.89E-08
benzo(a)pyrene	1.85E-05	3.25E-06	6.13E-05	6.66E-06				
benzo(b)flouranthene	1.84E-06	3.23E-07	6.28E-06	6.63E-07	2.27E-06	2.78E-07	5.59E-06	7.36E-07
benzo(k)flouranthene			6.01E-07	6.34E-08				
beryllium			1.29E-06	1.36E-07	9.15E-06	1.12E-06	2.26E-05	2.97E-06
chloroform					2.71E-08	3.33E-09	6.68E-08	8.80E-09
dibenz(a,h)anthracene	1.68E-05	2.94E-06	5.72E-05	6.03E-06				
dieldrin			1.05E-06	7.65E-08				
indeno(1,2,3-c.d)pyrene	1.71E-06	2.99E-07	5.82E-06	6.13E-07				
PCBs	5.03E-05	3.14E-06	9.10E-05	4.28E-06				
vinyl chloride					8.75E-05	1.07E-05	4.31E-04	5.67E-05
2,3,7,8-TCDD (TEF)	6.36E-06	5.14E-07	1.32E-05	8.25E-07				
HxCDD			1.31E-06	8.23E-08				
TOTAL	9.75E-05	1.08E-05	2.47E-04	2.02E-05	2.37E-04	2.90E-05	7.99E-04	1.05E-04



**TABLE 7.1.5**  
**EXPOSURE ASSUMPTIONS AND POTENTIAL EFFECT ON EXPOSURE ASSESSMENT<sup>1</sup>**

Exposure Assumption	Potential Magnitude for Overestimation of Exposure	Potential Magnitude for Underestimation of Exposure	Potential Magnitude for Over- or Under-Estimation of Exposure
<b>Environmental Sampling and Analysis</b>			
Sufficient samples may not have been taken to characterize the media being evaluated			Low
Data collected were skewed towards the most contaminated areas	Low		
Effects on the quantitative risk of high detection limits for PAHs	Moderate		
<b>Exposure Parameter Estimation</b>			
The use of RME scenarios for receptor populations		Low	
The use of CTE scenarios for receptor populations	Low		
<b>Exposure Pathways</b>			
Selection of exposure pathways would not adequately characterize future land use			Low
<b>Pathway Analysis</b>			
Assuming the risk to a potential receptor from contact with groundwater during showering is equal to the risk for ingestion of VOCs in groundwater, instead of using a model			Low

Low      1 order of magnitude risk  
Moderate 1 to 3 orders of magnitude risk  
High      3 orders of magnitude

<sup>1</sup>From Baseline Risk Assessment, August 1994

**TABLE 7.2.2**  
**SUMMARY OF ECOLOGICAL RISK ASSESSMENT**  
**PETROCHEM/EKOTEK SITE**

Chemical	On-Site Migratory Birds				Peregrine Falcons			
	COC	Risk Evaluation			COC	Risk Evaluation		
		Risk Screening	Potential Chronic Risk <sup>1</sup>	Potential Acute Risk <sup>1</sup>		Risk Screening	Potential Chronic Risk <sup>1</sup>	Potential Acute Risk <sup>1</sup>
1,1,1-Trichloroethane	X	--	--	--	--	--	--	--
Acetone	X	--	--	--	--	--	--	--
Tetrachloroethene	X	--	--	--	--	--	--	--
Methylene Chloride	X	--	--	--	--	--	--	--
Ethylbenzene	X	--	--	--	--	--	--	--
Toluene	X	--	--	--	--	--	--	--
Xylenes	X	--	--	--	--	--	--	--
Trichlorobenzene	X	--	--	--	--	--	--	--
Mixed PAHs	X	--	--	--	--	--	--	--
Benzo(a)pyrene	X	X	X	--	--	--	--	--
Phalate Esters	X	--	--	--	--	--	--	--
4,4'-DDD	X	--	--	--	--	--	--	--
Aldrin	X	--	--	--	--	--	--	--
Dieldrin	X	--	--	--	--	--	--	--
Beta-Hexachlorocyclohexane	X	--	--	--	--	--	--	--
Delta-Hexachlorocyclohexane	X	--	--	--	--	--	--	--
Endosulfans	X	--	--	--	--	--	--	--
Endrin Ketone	X	--	--	--	--	--	--	--
Polychlorinated Biphenyls	X	X	--	--	--	--	--	--
Beryllium	X	X	--	--	--	--	--	--
Selenium	X	--	--	--	--	--	--	--
Silver	X	--	--	--	--	--	--	--
Thallium	X	X	X	--	X	--	--	--
Dioxins/Furans	X	X	X	--	X	--	--	--

<sup>-1</sup> - Potential substantial risk based on conservative assumptions.

X - Chemical retained as COC, retained for risk assessment, or potentially presents a risk.

-- - Chemical not retained, etc.

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
**Page 1 of 21**

<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Chemical-Specific ARARs</b>		
<b>Safe Drinking Water Act (42 USC Sections 300f-300j-26)</b>		
40 CFR Part 141, including Subparts B and G	Establishes health-based standards for public drinking water systems (MCLs).	These regulations are relevant and appropriate because the shallow ground water beneath the Petrochem/Ekoteck Site is being used or may be used in the future as a source of water for a public water system or private supply wells. Treated ground water from the treatment plant would be injected into the shallow ground-water system under alternative 8. The standards are relevant and appropriate throughout the ground water for alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, and to the treatment plant effluent at the point of injection for alternative 8.
40 CFR Part 141, Subpart F	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects, with an adequate margin of safety (MCLGs).	Non-zero MCLGs are relevant and appropriate for alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, since ground water is in the vicinity of the Petrochem/Ekoteck site is being used or may be used as a source of water for a public water system or private supply wells.
40 CFR Part 143	National Secondary Drinking Water Standards establish welfare-based standards for public water supply systems.	The National Secondary Drinking Water regulations are relevant and appropriate because the shallow ground water at the Petrochem/Ekoteck site is being used or may be used in the future as a source of water for a public water system or private supply wells.
<b>Federal Water Pollution Control Act (amended by the Clean Water Act, 42 USC Section 7401, et seq.)</b>		
40 CFR Part 403, Pre-Treatment Standards	Establishes standards for discharge of toxic pollutants to Publicly Owned Treatment Works (POTWs).	This regulation is relevant and appropriate for discharge being sent offsite to the local POTW under alternative 7 and as part of the contingencies. Pre-treatment is necessary if standards are not met.
<b>Solid Waste Disposal Act - RCRA Subtitle C (42 USC Section 6901, et seq.)</b>		
40 CFR Part 264, Subpart F	Sets ground water protection standards for land disposal units and releases from solid waste management units.	Alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 are relevant and appropriate because the site operates like a hazardous waste management (land disposal) unit. The State of Utah operates an approved delegated program for this portion of RCRA. See requirements under Utah Solid and Hazardous waste Act and accompanying regulations.

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Toxic Substances Control Act (15 USC Section 2605)</b>		
40 CFR Part 761  Subpart G, PCB Spill Cleanup Policy	Sets forth PCB Spill policy and disposal requirements.	Spills and other uncontrolled discharges of PCBs at concentrations of 50 ppm or greater constitute the disposal of PCBs. PCBs resulting from the clean-up and removal of spills, leaks, or other uncontrolled discharges, must be stored and disposed in accordance with this regulation. Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 address PCBs that spilled, leaked, or were discharged during the operation of the Petrochem/Ekoteck facility. All of the above alternatives will be disposing PCBs in a permitted TSCA landfill as part of the cleanup alternatives therefore the requirements to clean up to 10 ppm in the soils is relevant and appropriate for alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.
<b>Utah Water Quality Act (UCA Section 19-5-101, et seq.)</b>		
UCA 19-5-101 and UCA Section 19-5-107	Establishes the rulemaking and enforcement authority for the regulation of water quality with the Utah Water Quality Board.	This act makes it unlawful for any person to discharge a pollutant into waters of the State or to cause pollution that constitutes a menace to the public health and welfare, or is harmful to wildlife, fish or aquatic life, or impairs domestic, agricultural, industrial, recreational, or other beneficial uses of water, or to place or cause to be placed any wastes in a location where there is probable cause to believe it will cause pollution. This Act is applicable to alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the Petrochem/Ekoteck site in that pollutants were discharged into the soils and the ground water during operations of the facility.

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**

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Citation	Description	Evaluation
<b>Utah Water Quality Act (UCA 19-5-101, et seq.)</b>		
UAC R317-6, The Groundwater Protection Rule	Establishes groundwater quality standards, groundwater classes, and groundwater class protection levels for the protection of groundwater quality of the State.	Groundwater quality standards establish numerical clean-up levels for contaminated groundwater. These standards are relevant and appropriate to alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the Site to the extent there is ongoing groundwater contamination.
UAC R309, Utah Drinking Water Rules	These rules establish maximum contaminant levels in public drinking water systems within the State of Utah.	These levels are relevant and appropriate because the shallow ground water beneath the Petrochem/Ekotek Site is being used or may be used in the future as a source of water for a public water system or private supply wells. Treated ground water from the treatment plant would be injected into the shallow ground-water system under alternative 8. The standards are relevant and appropriate throughout the ground water for alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, and to the treatment plant effluent at the point of injection for alternative 8.

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Air Conservation Act (UCA 19-2-101, et seq.)</b>		
UAC R307-1-1, and R307-1-3, Utah Air Conservation Rules  Fugitive Dust Standard, R307-1-3.1.8.A and R307-1-4.5.2, U.A.C.  All Emissions subject to BACT, R307-1-3.1.8.B, U.A.C.  Analysis for Degenerate Air Quality, R307-1-3.1.8.B, U.A.C.	These regulations constitute the legal bases for control of air pollution sources in the State of Utah. The National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare. Standards have been set for six pollutants: (1) particulate matter equal to or less than 10 microns particle size; (2) sulfur dioxide; (3) carbon monoxide; (4) ozone; (5) nitrogen dioxide; and (6) lead. National Standards of Performance for New Stationary Sources (NSPS), National Prevention of Significant Deterioration of Air Quality (PSD) standards, and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) also apply and are legally enforceable in Utah.	The State of Utah air pollution regulations are relevant and appropriate to the control of fugitive dust and particulate emissions at the site. The NAAQS Standards are not enforceable in and of themselves, rather it is the emissions standards, which are promulgated to attain the NAAQS, that are directly enforceable and are ARARs. Those standards and requirements include, the fugitive dust standard; a requirement that all emissions are subject to BACT; and an analysis is required to assure that any emissions will not cause air quality to degenerate beyond any pertinent level. All proposed remedial technologies should be evaluated to determine whether any New Source Performance Standards may be considered ARARs.
<b>Utah Underground Storage Tank Act (UCA 19-6-401)</b>		
UAC R315-101, Utah Solid and Hazardous Waste Rules (TPH clean-up levels)	This regulation sets standards for cleaning up total petroleum hydrocarbons (TPH). This regulation, in combination with the Division of Environmental Response and Remediation's "Guidance for Estimating Numeric Cleanup Levels for Petroleum-Contaminated Soil at Underground Storage Tank Release Sites" which is a TBC that sets standards for cleaning up TPH.	Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 remove two 1,000 gallon underground storage tanks in the former tank farm area. In addition, all the alternatives address the soils at the location of the previously removed UST #2. Because the waste at the site is sufficiently similar to RCRA hazardous waste, the regulation is relevant and appropriate to all alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.
<b>Chemical-Specific TBCs</b>		
ASTM ES 38-94, "Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites"	Risk-based corrective action (RBCA) is a generic term for corrective action strategies that categorize sites according to risk and move all sites toward completion using appropriate levels of action and oversight. ASTM's RBCA provides an effective strategy for incorporating site-specific data into a scientifically based decision-making process to manage Leaking Underground Storage Tanks (LUST) sites.	This guidance integrates risk and exposure assessment practices that mirror EPA's risk assessment that was completed at the Petroleum/Ekoteck site. This guidance is directly applicable such that the TPH constituents cleanup goals for soils shall be as specified in the soils preliminary remediation goals performance standards for alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
Clean Air Act Section 109, 301(a)  40 CFR Part 50	National Primary and Secondary Air Quality Standards. Pursuant to the Clean Air Act Section 109, EPA has promulgated National Ambient Air Quality Standard (NAAQS) for ambient air, to protect the public health and welfare. Standards have been set for six pollutants: (1) particulate matters equal to or less than 10 micron particle size; (2) sulfur dioxide; (3) carbon monoxide; (4) ozone; (5) nitrogen dioxide; and (6) lead	The NAAQS may be used as other criteria or guidelines to be considered (TBC) during operations of the excavation of the soils and LNAPL, thermal desorption of the soils and air sparging of the ground water. The NAAQS are TBCs for alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.
Guidance for Estimation Numeric Cleanup Levels for Petroleum-Contaminated Soil at Underground Storage Tank Release Sites	This guidance established cleanup goals for TPH.	For the Petrochem/Ekotek site, the specified cleanup level is 100 mg/kg TPH. The State of Utah is currently in transition from the use of this guidance to the adoption of RBCA therefore this guidance may no longer be considered. The hot spot criteria requires removal of soil that exceed 100,000 mg/kg TPH levels.
<b>Action-Specific ARARs</b>		
<b>Solid Waste Disposal Act (42 USC Section 6901, <u>et seq</u>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <u>et seq.</u>)</b> <b>Utah Solid Waste Management Act (UCA Section 19-6-501, <u>et seq.</u>)</b>		
40 CFR 241, Guidelines for the land disposal of solid wastes  UAC R315-301: Solid Waste Authority, Definitions, and General Requirements UAC R315-302: Solid Waste Facility Location Standards UAC R315-303: Landfilling Standards UAC R315-304: Industrial Solid Waste Facility Requirements UAC R315-305: Class IV Landfill Requirements UAC R315-307: Landtreatment Disposal Standards	Establishes guidance for the land disposal of all solid waste materials and delineates minimum level of performances required of any solid waste land disposal site operation.	Offsite disposal of waste will occur at the Petrochem/Ekotek site. The offsite disposal of waste classified as solid waste must comply with both the substantive and administrative requirements of these regulations pursuant to EPA's offsite policy. This regulation is directly applicable of alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10. In addition, Part 241 requirements and cited State rules are relevant and appropriate with respect to the performance of the operations and maintenance of soil covers under alternatives 2, 3, 4, 5, and 10 which leaves solid waste in place (e.g., the debris area, contaminated soils consolidated on-site).

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<p style="text-align: center;"><b>Solid Waste Disposal Act (42 USC Section 6901, <u>et seq</u>)</b>  <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <u>et seq.</u>)</b>  <b>Utah Solid Waste Management Act (UCA Section 19-6-501, <u>et seq.</u>)</b></p>		
<p>40 CFR Part 257, Criteria for Classification of Solid Waste Disposal Facilities and Practice</p> <p>UAC R315-301: Solid Waste Authority, Definition s, and General Requirements</p> <p>UAC R315-302: Solid Waste Facility Location Standard</p>	<p>Establishes criteria for use in determining which solid waste disposal facilities and practice pose a reasonable probability of adverse effects on health or the environment and thereby constitute prohibited open dumps.</p>	<p>The Petrochem/Ekotak site has an area of waste identified as buried debris. The buried debris area and tank farm area where waste will be consolidated and covered (left in place) are subject to the classification of solid waste and the associated limited of release or exposure of the solid waste with respect to flood plains, endangered species, surface water, ground water, production of crops, disease, air and safety. This regulation is relevant and appropriate to alternative 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.</p>
<p>40 CFR Part 258, Criteria for Municipal Solid Waste Landfills UAC R315-303: Landfilling Standards</p> <p>Subpart E, Ground-Water Monitoring and Corrective Action UAC R315-308: Groundwater Monitoring Requirements</p> <p>Subpart F, Closure and Post-Closure Care UAC R315-302: Solid Waste Facility Location Standard UAC R315-303: Landfilling Standards UAC R315-304: Industrial Solid Waste Facility Requirements</p>	<p>Establishes design and operation criteria for all new municipal solid waste landfills or expansions of existing facilities; and sets forth closure/post-closure requirements.</p>	<p>Alternative 2, 3, 4, 5, and 10 partially remove the solid waste located in the debris area and caps the remaining debris and consolidates and covers other waste in the former tank farm area. This regulation is relevant and appropriate for alternative 2, 3, 4, 5, and 10 for closure and post-closure requirements.</p>
<p>40 CFR 260, Hazadous Waste Management System: General</p> <p>UAC R315-1: Utah Hazadous Waste Definitions and References</p> <p>UAC R315-2: General Requirements - Identification and Listing of Hazardous Waste</p>	<p>Establishes the definitions of terms, general standards, and overview information applicable to parts 260 through 265 and 268.</p>	<p><b>This regulations is applicable in as much as the definition and overview provided in this regulation apply to the applicable or relevant and appropriate sections of parts 260 and 265 and 268. See specific information regarding parts 260 through 265 and 268 below.</b></p> <p><b>The State of Utah has an approved, delegated program under RCRA for these requirements.</b></p>



**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <u>et seq</u>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <u>et seq</u>)</b>		
<p>40 CFR Part 261, Identification and Listing of Hazardous Waste</p> <p>UAC R315-2-3: Definition of Hazardous Waste</p> <p>UAC R315-2-4: Exclusion</p> <p>UAC R315-2-7: Residues of Hazardous Waste in Empty Containers</p> <p>UAC R315-2-9: Characteristic of Hazardous Waste</p> <p>UAC R315-2-10: List of Hazardous Waster</p> <p>UAC R315-2-11: Discarded Commercial Chemical Products</p> <p>UAC R315-50: Appendices</p>	<p>Identifies those solid wastes which are subject to regulation as hazardous wastes under part 124, 262, 263, 264, 265, 270, and 271, and which are subject to the notification requirements of section 3010 of RCRA.</p>	<p>This classification of the waste will be determined in the field for purpose of proper offsite disposal and treatment. At present, the soils at the site have not been determined to be hazardous as defined by subpart C, characteristic of hazardous waste. However, the waste is a pollutant, contaminant or hazardous substance that presents a risk to human health and the environment therefore the waste is sufficiently similar such that RCRA regulations are relevant and appropriate.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>40 CFR Part 262, Standards Applicable to Generators of Hazardous Waste</p> <p>UAC R315-5: Hazardous Waste Generator Requirements</p>	<p>Establishes standards for RCRA generators to include shipment of hazardous of waste from a treatment, storage, or disposal facility; treatment, storage or disposal of hazardous waste onsite; and compliance requirements and penalties for persons who generates a hazardous waste but do not comply with this part.</p>	<p>The remediation activities at the Petrochem/Ekotak site will generate waste that will be sufficiently similar to RCRA hazardous waste such that use of this requirement is well suited to the situation. The requirement is relevant and appropriate to the ground water treatment residuals (alternative 4 and 8); soils and debris excavated from the site (all alternatives); waste generated during construction activities for the treatment facility as described in alternative 8; and residuals, if any, from the thermal treatment of soils and LNAPL in alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10. Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 included the shipment of sufficiently similar hazardous waste to an offsite facility and temporary storage of waste during implementation of the remedies thus this part is relevant and appropriate to these alternatives.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <u>et seq.</u>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <u>et seq.</u>)</b>		
<p>40 CFR Part 264, Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities Subpart B. General Facility Standards</p> <p>UAC R315-8-2 (TSDFs): General Facility Standards</p> <p>Subpart C, Preparedness and Prevention</p> <p>UAC R315-8-3: Preparedness and Prevention</p> <p>Subpart D, Contingency Plan and Emergency Procedures</p> <p>UAC R315-8-4: Contingency Plan and Emergency Procedures</p>	<p>Establishes minimum standards that define the acceptable management of hazardous waste for owners and operators of facilities which treat, store, or dispose of hazardous waste.</p>	<p>Alternative 2, 3,4, 5, 6, 7, 8, 9. and 10 perform treatment of the soils or soils saturated with LNAPL; dispose of hazardous waste offsite and stores waste during the implementation of the remedy, remediates the ground water and consolidates contaminated soils in the former tank farm area for final disposal. Because these remediations activities constitute treatment, storage, and/or disposal activities, the requirements of this part are relevant an appropriate to the various components of the alternatives cited. Thus, site activities must meet these standards, which include waste analysis, site security emergency control and response equipment, personnel training, contingency planning, and implementation.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>40 CFR Part 264, Subpart F, Releases from Solid Waste Management Units</p> <p>UAC R315-8-6: Groundwater Protection</p>	<p>Establishes requirements to detect, characterize, and respond to releases to the uppermost aquifer from a facility that treats, stores, or disposes of hazardous waste.</p>	<p>Alternative 2, 3, 4, 5, and 10 contain the debris area with a cover and alternatives 2, 3, and 10 consolidations waste in the former tank farm area under a cover thereby creating a waste management unit(s). The design of the ground water compliance monitoring progress for the detection of releases from the solid waste management unit cited in the above alternative is relevant and appropriate, as well as any corrective action that may be necessary should the hazardous constitute exceed the established concentration limits specified in the compliance monitoring program.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq</i>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <i>et seq.</i>)</b>		
<p>40 CFR Part 264, Subpart G, Closure and Post-Closure</p> <p>UAC R315-8-7: Closure and Post-Closure</p>	<p><b>Establishes</b> requirement for the closure and post-closure of facilities that treat, store, or dispose of hazardous waste.</p>	<p>Because excavation, consolidation and containment via cover of contaminated material constitute disposal of a waste that is sufficiently similar to RCRA hazardous waste such that use of the requirement is well suited to the situation, the requirement is relevant and appropriate to the activities described in alternative 2, 3, 4, 5, and 10. Because the alternative 2, 3, 4, 5, 6, 7, 8, and 9 provide onsite treatment and temporary storage of the waste, this requirement is relevant and appropriate. Closure and post-closure care for this disposal areas must meet these standards which include removal of waste, waste residues, contaminated system components, and contaminated subsoils; or closure with waste and/or contamination in place with containment system and post-closure care to include ground water monitoring and inspection and maintenance on containment and monitoring systems.</p> <p>The State of Utah has an approved delegated program under RCRA for these requirements.</p>
<p>40 CFR Part 264, Subpart I, Use and Management of Containers</p> <p>UAC R315-8-9: Use and Management of Containers</p>	<p>Establishes operating and performance standards for containers storage of hazardous waste and applies to owners and operators of all hazardous waste facilities that store containers of hazardous waste.</p>	<p>The ground water monitoring program, and LNAPL recovery at the Petrochem/Ekotek site is expected to store hazardous waste at the site during the implementation of alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10. The intrinsic remediation/attenuation pilot study is expected to produce large quantities of contaminated waste that will most likely be stored in a container under alternative 2, 3, 4, 5, 6, 9, and 10. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to activities involving storage or temporary storage of contaminated materials in containers which includes the alternative cited in this paragraph.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq</i>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19-6-101, <i>et seq.</i>)</b>		
40 CFR Part 264, Subpart J, Tank System  UAC R315-8-10: Tanks	Establishes operating and performance standards for tank systems to include closure and post-closure requirements. This regulation applies to owners and operators of facilities that use tank system for storage or treating hazardous waste.	<p>Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 excavation two 1,000 gallon tanks from the former tank farm area and may store ground water in tanks if contingencies are implemented. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities involving closure of the tanks.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
40 CFR Part 264, Subpart L, Waste Piles  UAC R315-8-12: Waste Files	Establishes operating and performance standards for waste piles to include closure and post-closure requirements. This regulation applies to owners and operators of facilities that store or treat hazardous waste in piles.	<p>Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 all excavation soils and store soils onsite in preparation of treatment or consolidation. The manner in which the soils are stored constitutes a waste pile. Alternative 9 utilizes land farming that may be sufficiently similar to treatment using waste piles that this regulation is relevant and appropriate. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities described above, as well as to the closure and post-closure of waste piles.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
40 CFR Part 264, Subpart M, Land Treatment  UAC R315-8-13: Land Treatment	Establishes operating and performance standards for land treatment units to include closure and post-closure requirements. The regulation applies to owners and operators of facilities that treat or dispose of hazardous waste in land treatment units.	<p>Alternative 9 utilizes land farming that may be sufficiently similar to treatment using land treatment units that this regulation is relevant and appropriate. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities described above, as well as to the closure and post-closure of land treatment units.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq</i>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <i>et seq.</i>)</b>		
<p>40 CFR Part 264, Subpart N, Landfills</p> <p>UAC R315-8-14: Landfills</p>	<p>Establishes operating and performance standard for landfills to include closure and post-closure requirements. The regulation applies to owners and operators of facilities that dispose of hazardous waste in landfills.</p>	<p>Alternative 2, 3, 4, 5, and 10 have containment of remaining debris and consolidate and contain waste onsite that is sufficiently similar to landfilling. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities described above, as well as to the closure and post-closure of landfills.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>40 CFR Part 264, Subpart O, Incinerators</p> <p>UAC R315-8-15: Incinerators</p>	<p>Establishes operating and performance standards for incinerators (includes thermal treatment by definition) to include closure requirements. The regulation applies to owners and operators of facilities that incinerate hazardous waste.</p>	<p>Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 have varying levels of thermal desorption (a form of incineration, by definition in waste to be treated is sufficiently similar to RCRA hazardous waste, the use of the regulation is well suited to the situation, therefore the requirements are relevant and appropriate to the thermal treatment components of the alternative cited in this paragraph.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq</i>)</b> <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <i>et seq.</i>)</b>		
40 CFR Part 264, Subpart AA, Air Emission Standards for Process Vents  UAC R315-8-17: Air Emission Standards for Process Vents	Establishes operating and performance standard for air emissions from process vents. The regulation applies to owners and operators of facilities that treat, store or dispose of hazardous wastes and applies to process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10 ppm.	<p>Alternative 2, 3, 4, 5, 6, 7, 8, and 9 have varying levels of thermal desorption which may have process vents and because the gases that may be released are sufficiently similar to RCRA hazardous waste such that the use of the regulation is well suited to the situation, the requirement is relevant and appropriate to the onsite thermal treatment system. Alternatives 4 and 8 may include process vents as components of air sparging/vapor extraction and the treatment facility using UV oxidation, respectively, in the treatment of the ground water. These ground water treatment systems must meet these standards, which include standards for process vents and test methods and procedures, and are therefore considered relevant and appropriate requirements.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>
40 CFR Part 265, Subpart P, Thermal Treatment  UAC R315-7-23: Thermal Treatment	Establishes operating and performance standards for thermal treatment. The regulation applies to owners or operators of facilities that thermally treat hazardous waste in devices other than enclosed devices using controlled flame combustion. Thermal treatment in enclosed devices using controlled flame combustion is subject to the requirements of subpart O.	<p>Alternative 2, 3, 4, 5, 6, 7, 8, and 9 have varying levels of thermal desorption (a form of incineration, by definition in 40 CFR part 260) onsite. Whether the thermal desorption unit will be an enclosed device using controlled flame combustion or another type of device will be determined during the Remedial Design. Therefore, this regulation will be considered relevant and appropriate if the thermal desorption unit incorporates any device other than an enclosed device using controlled flame combustion which shall be governed by the requirements of subpart O. Because the waste to be treated is sufficiently similar to RCRA hazardous waste, the use of the regulation is well suited to the situation, therefore the requirements are relevant and appropriate to the thermal treatment components of the alternatives cited in this paragraph given the conditions described.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<p style="text-align: center;"><b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq</i>)</b>  <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <i>et seq.</i>)</b></p>		
<p>40 CFR Part 265, Subpart Q, Chemical, Physical, and Biological Treatment</p> <p>UAC R315-7-24: Chemical, Physical, and Biological Treatment</p>	<p>Establishes operating and performance standard for chemical, physical, and biological treatment. The regulation applies to owners and operators of facilities which treat hazardous wastes by chemical, physical, or biological methods in other than tanks, surface impoundments, and land treatment facilities.</p>	<p>Alternative 8 uses chemical/physical treatment of ground water via UV oxidation in a treatment facility that is not considered a tank, surface impoundment or land treatment facility. Alternative 4 uses physical treatment of ground water via air sparging/vapor extraction which will not use a tank, surface impoundment or land treatment facility.</p> <p>Alternatives 2, 3, 5, 6, 9 and 10 may use enhancements to the biological treatment of the ground water via intrinsic remediation/attenuation which will not occur in a tank, surface impoundment or land treatment facility. Because the chemical, physical and biological treatment is sufficiently similar to RCRA hazardous waste such that the use of the requirement is well suited to the situation, the requirement is relevant and appropriate to the alternatives cited in this paragraph.</p> <p>The State of Utah has an approved, delegated program under RCRA for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**  
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Citation	Description	Evaluation
<p style="text-align: center;"><b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq.</i>)</b>  <b>Utah Solid and Hazardous Waste Act (UCA Section 19–6-101, <i>et seq.</i>)</b></p>		
<p>40 CFR Part 2647, Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities</p>	<p>Establishes standard for new hazardous waste land disposal facilities. The regulation applies to owners and operators of new hazardous waste landfills, surface impoundments, land treatment facilities and individually permitted Class I underground injection wells.</p>	<p>Alternative 2, 3, 4, 5, and 10 have containment of remaining debris and consolidates and contains waste onsite that is sufficiently similar to landfilling and associated ground water monitoring. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activities described, as well as to the closure and post-closure of landfills.</p> <p>Alternative 9 utilizes land farming that may be sufficiently similar to treatment using land treatment units so that this regulation may be relevant and appropriate. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activity described above, as well as to the closure and post-closure of land treatment units.</p> <p>Alternative 8 injects the treated ground water into the aquifer which is sufficiently similar to Class I underground injection wells. Because the waste is sufficiently similar to RCRA hazardous waste, this regulation is relevant and appropriate to the activity described.</p> <p>The state of Utah has an approved, delegated program under RCRA for these requirements.</p>
<p>58 Federal Register 8658  40 CFR Part 264, Subpart S, Corrective Action Management Units (CAMUs)</p>	<p>Permits the agency to establish a Corrective Action Management Unit (CAMU) or units at CERCLA remedial sites.</p>	<p>EPA has designated the Petrochem/Ekoteck Site as a CAMU.</p> <p>Because the waste is sufficiently similar to RCRA hazardous waste, the requirement is relevant and appropriate to the activities.</p>



**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternative**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Solid Waste Disposal Act (42 USC Section 6901, <i>et seq.</i>)</b>		
<p>40 CFR, Part 280, Technical Standard and Corrective Action Requirement for Owners and Operators of Underground Storage Tank (UST)</p> <p>UAC R311-202: UST Technical Standards</p> <p>UAC R311-207: Assessing the PST Fund for LUSTs</p> <p>UAC R311-211: Corrective Action Clean-up Standard for CERCLA and UST Sites</p>	<p>Established technical standards and corrective action requirement for underground storage tanks. The regulation applies to all owners and operators of an underground storage tank system</p>	<p>Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 remove two 1,000 gallons underground storage tanks in the former tank farm areas. In addition, all the alternatives address the soil at location of the previously removal UST #2. Because the waste at the site is sufficiently similar to RCRA hazardous waste, the regulation is relevant and appropriate to alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.</p> <p>The State of Utah has an approval, delegated program under RCRA for these requirement.</p>
<b>Federal Water Pollution Control Act (amended by the Clean Water Act) Utah Water Quality Act (UCA Section 19-5-101, <i>et, seq.</i>)</b>		
<p>40 CFR Part 122, EPA Administrated Permit Programs: Then National Pollutant Discharge Elimination System (NPDES)</p>	<p>Establishes requirements for stormwater discharged related t industrial activity. Stormwater runoff, snow melt runoff, and surface runoff and drainage associated with remedial actions which discharge to surface water shall be conducted in compliance with RCRA, FWQC, CWA technologies-based standards and best management practices.</p>	<p>Although none of the alternatives have a discharge component as part of the remedies, stormwater discharges may occur during the implementation of the remedies (e.g., runoff discharge from the open trenches or open excavation of the LNAPL during precipitation event). Therefore, the stormwater discharge limits must be meet which include sampling, analysis, and treatment requirement. Because the waste at the site is sufficiently similar to waste regulated by NPDES permits, this regulation is relevant and appropriate to the activities described in this paragraph.</p> <p>The State of Utah has an approval, delegated program for these requirements.</p>

**Table 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Hazardous Substances Mitigation Act (UCA 19-301, et,seq.)</b>		
UAC R315-101: Clean-up Action and Risk-Based Closure Standards for RCRA Sites	Establishing clean-up standard for remedial decision using risk analysis, and management for RCRA corrective action sites.	Because sites is not being clean-up, as defined by the rule, required appropriate site management.
<b>Toxic Substance Control Act (15 USC 2625 and 2665)</b>		
40 CFR Part 61  Subpart G, PCB Spill Clean-up Policy	Set forth PCB Spill policy and disposal requirement.	PCBs resulting from the clean-up and removal of spill, leaks, or other uncontrolled discharges, must be stored and disposed in accordance with this regulation. Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 address PCBs that spilled, leaked, or were discharged during the operation of the Petrochem/Ekotak facility. All of the above alternative will be disposing PCBs as part of the cleanup alternatives thus the requirement to clean up to 10 ppm in the soils is relevant and appropriate for Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 .
<b>Safe Drinking Water Act</b>		
40 CFR Part 144; Underground Injection Control Program  Part 145, State UIC Program requirements  Part 146, Underground Injection Control Program: Criteria and Standards.  Part 147, State Underground Injection Control Program	Established standards for construction and operation of injection walls. Provided for protection of underground sources of drinking water .	Alternative 8 reinjects treated water into the aquifer beneath the Petrochem/Ekotak site. The requirement of this regulation is applicable to alternative 8. The requirements include constructing, operating, and maintaining a well in a manner that does not result in contamination of an underground source of drinking water at levels that violate MCLs or otherwise affect the health of persons. These requirements will be met by ensuring the effluent from the ground water treatment facility under alternative 8 meets standards that are protective of human health (based on MCLs and risk-based concentration).  The State of Utah has an approval, delegated program for these requirements.

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**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Clean Air Act</b>		
40 CFR Part 60, Standard of Performance for New Stationary Source	Establishes performance standards for new stationary sources of air pollutants	Alternative 2,3, 4, 5, 6, 7, 8, and 9 have varying level of thermal desorption of soils onsite. Alternative 8 treats ground water via UV oxidation in an onsite treatment facility. Because these treatment components may create air pollutants, these alternatives are relevant and appropriate for the activities described in this paragraph.
40 CFR Part 61, National Emission Standards for Hazardous Air Pollutants	Establishes emission standards for hazardous air pollutants from specific sources.	Alternative 2,3, 4, 5, 6, 7, 8, and 9 have varying level of thermal desorption of soils onsite. Alternative 8 treats ground water via UV oxidation in an onsite treatment facility. Because these treatment components may create emission from the treatment of benzene, beryllium, chloroform, inorganic arsenic, mercury, manganese, nickel, trichloroethylene, and vinyl chloride, these alternatives are relevant and appropriate for the activities described in the paragraph.
<b>Utah Air Conservation Act (UCA 19-2-101, et seq.)</b>		
UAC R307-1-1, and R307-1-3, Utah Air Conservation Rules  UAC, R307-1-3.1.8.B, Analysis for Degenerated Air Quality	These regulations constitute the legal bases for control of air pollution sources in the State of Utah. The National Ambient Air Quality Standard (NAAQS) to protect the public health and welfare. Standards have been set For six pollutants: (1) particulate matter equal to or less than 10 microns particle size; (2) sulfur dioxide; (3) carbon monoxide; (4) ozone; (5) nitrogen dioxide; and (6) lead. National Standard of Performance for New Stationary Sources (NSPS). National Prevention of Significant Deterioration of Air Quality (PSD) standards, and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) also apply and are legally enforceable in Utah.	The Sites of Utah are pollution regulations are relevant and appropriate to the control of fugitive dust and particulate emission at the site. The Federal NAAQS standards are not enforceable in and of themselves, rather it is the emissions standards, which are promulgated to attain the NAAQS, that are directly enforceable and ARARs. Those standards are requirements include, the fugitive dust standard; a requirement that all emissions are subject BACT; and an analysis is required to assure that any emission will not cause air quality to degenerate beyond any pertinent level. All proposed remedial technologies should be evaluated to determine whether any New Source Performances Standards may be considered ARARs.
UAC R307-1-3-8.A and R307-1-4-5-5: Fugitive Dust Standards.	Regulations Fugitive dust in general (e.g., from windblown soils), and associated with construction.	Alternative 2,3, 4, 5, 6, 7, 8, 9, and 10 involved construction activities that disturb the soils and create fugitive dust. This applicable requirement mandates BACT to control fugitive dust.

**Tables 8.4**  
**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Air Conservation Act (UCA 19-101, et seq.)</b>		
UAC R307-1-3.8.A	Requires BACT for all emissions.	Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 generates emissions either through construction fugitive dust or release of VOCs from excavation. This applicable requirement mandates BACT for all emissions, unless specifically exempted.
UAC R307-1-4: Standard for VOC emissions and dust	Regulates VOC emissions.	Alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10 generates emissions either through construction fugitive dust or release of VOCs from excavation. This applicable requirement limits VOC emissions from the Site, e.g., direct excavation of LNAPL.
<b>Utah Water Quality Act (UCA 19-5-101)</b>		
UCA 19-5-101	Establishes the rule making and enforcement authority for the regulation of water quality with the Utah Water Quality Board.	This act makes it unlawful for any person to discharge a pollutant into waters of the State or to cause pollution that constitutes a menace to the public health and welfare, or is harmful to wildlife, fish, or aquatic life, or impairs domestic, agricultural, industrial, recreational, or other beneficial uses of water, or to place or cause to be placed any waste in a location where there is probable cause to believe it will cause pollution. This Act is applicable to alternatives 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 at the Petrochem/Ekotak site in that pollutants were discharge into the soils and the ground water during operations of the facility.
UAC R317-7, Underground Injection Control Program	Establishes standards for construction and operation of injection walls. Provided for protection of underground sources of drinking water.	Alternative 8 reinjects treated water into the aquifer beneath the Petrochem/Ekotak sites. The requirement of this regulation is applicable to alternative 8. The requirement include constructing, operating, and maintaining a wall in a manner that does not result in contamination of an underground source of drinking water at levels that violate MCLs or otherwise affect the health of persons. These requirements will be met by ensuring the effluents from the ground water treatment facility under alternative 8 meet standards that are protective of human health (based on MCLs and risk-based concentrations).

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**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Air Conservation Act (UCA 19-5-101, et seq.)</b>		
UAC R317-8, Utah Pollutants Discharge Elimination System (UPDES) Rules and Permits Regulation	Establishes requirements for stormwater discharge related to industrial activity. Stormwater runoff, snow melt runoff, and surface runoff and drainage associated with remedial actions which discharge to surface water shall be conducted in compliance with RCRA, FWQC, CWA technologies-based standards and best management practices.	Although none of the alternatives have a discharge component as part of the remedies, stormwater discharges may occur during the implementation of the remedies (e.g., runoff discharge from the open trenches or open excavation of the LNAPL during precipitation events). Therefore, the stormwater discharge limits must be met which include sampling, analysis, and treatment requirements. Because the waste at the site is sufficiently similar to wastes regulated by NPDES permits, this regulation is relevant and appropriate to the activities described in the paragraph.
<b>Utah Hazardous Substances Mitigation Act (UCA 19-6-301, et. seq.) Utah Underground Storage Tank Act (UCA 19-6-401, et. seq.)</b>		
UAC R311-211: Corrective Action Clean-up Standard Policy – UST and CERCLA Sites	Establishes general standards for clean-up of contaminated sites.	Requires source elimination or control, and establishes various numerical standards. At this site, these standards will be met by meeting other ARARs.
UAC R311, Underground Storage Tank Rules	Establishes requirements for the removal of underground storage tanks (USTs), required cleanup of any leakage attributes to the USTs while in service, and closure requirement for a facility after removal of the UST.	Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 remove two 1,000 gallon underground storage tanks in the former tank farms areas. These alternatives also address the soils at the location of the previously removed UST #2. Because the waste at the site is sufficiently similar to constituents governed by this regulation is relevant and appropriate to these alternative.
40 CFR Part 279  Utah Used Oil Management Act, UCA 19-6-701, <i>et seq.</i> , UAC R315-15: Standard for the Management of Used Oil	Governs management, use oil and disposal of used oil.	This is applicable to material qualifying as used oil generated by the clean-up of this Site. It provides management standards, e.g., prohibiting use for dust suppression.
UAC R315-1, Utah Hazardous Waste Management Regulations	Establishes standards for the treatment storage and disposal of hazardous waste.	Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 include components of disposal, storage during implementation, and treatment of hazardous waste. Because the waste at the site is sufficiently similar to RCRA hazardous waste, the regulation is relevant and appropriate for the alternatives describes in the paragraph.

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**Federal and State ARARs and TBCs for all the Alternatives**

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<b>Citation</b>	<b>Description</b>	<b>Evaluation</b>
<b>Utah Hazardous Substances Mitigation Act (UCA 19-6-301, et. seq.)</b> <b>Utah Underground Storage Tank Act (UCA 19-6-401, et. seq.)</b>		
UCA 19-6-301, Utah Hazardous Substances Mitigation Act	Establishes requirements for remedial investigations and remedial action plans at CERCLA facilities.	Alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 are all remedial action plans for the remediation of the Petrochem/Ekotak site. The regulation is applicable to the activities of the alternatives limited in this paragraph
<b>Action-Specific TBCs</b>		
Clean Air Act Section 109, 301(a)  40 CFR Part 50	National Primary and Secondary Air Quality Standards. Pursuant to the Clean Air Act Section 109, EPA has promulgated National Ambient Air Quality Standards (NAAQS) for ambient air, to protect the public health and welfare. Standards have been set for six pollutants: (1) particulate matter equal to or less than 10 microns particle size; (2) sulfur dioxide; (3) carbon monoxide; (4) ozone; (5) nitrogen dioxide; and (6) lead.	The NAAQS may be used as other criteria or guidelines to be considered (TBC) during operations of the excavation on the soils and LNAPL, thermal desorption of the soils and air sparging and UV oxidation of the ground water. The NAAQS are TBCs for alternatives 2, 3, 4, 5, 6, 7, 8, 9, and 10.
ASTM ES 38-94, "Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites"	Risk-based corrective action (RCRA) is a generic term for corrective action strategies that categories sites according to risk and move all sites toward completion using appropriate levels of action and oversight, ASTM's RBCA provides an effective strategy for incorporating site-specific data into a scientific based decision-making process to manage Leakage Underground Storage Tanks (LUST) sites.	This guidance integrates risk and exposure assessment practice that mirror EPA's risk assessment that was completed at the Petrochem/Ekotak site. This guidance is directly applicable such that the TPH constituents cleanup goals for soils shall be as specific in the soils preliminary remediation goals performance standards for alternative 2, 3, 4, 5, 6, 7, 8, 9, and 10 .
Guidance for Estimating Numeric Cleanup Levels for Petroleum-Contaminated Soil at Underground Storage Tank Release Sites	This guidance establishes cleanup goals for TPH.	For the Petrochem/Ekotak site, the specific cleanup level is 100 mg/kg TPH. The State of Utah s is currently in transition from the use of this guidance to the adoption of RBCA therefore this guidance may no longer be considered. The hot spot criteria for TPH removal is 100,000 mg/kg.













## Legend

-  Onsite Thermal Description
-  Direct Removal of LNAPL through Excavation & Skimming
-  Complete Removal; Offsite TSCA Disposal of Debris; Treatment of Solids
-  Selective Excavation Onsite Thermal Description

